JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON.

VOL. XCVIII., No. 2292.—TUESDAY, APRIL 16, 1907.

EDITORIAL NOTES—GAS, &c.

The Hull Compulsory Sale Bill.

A POWERFUL speech by Mr. Balfour Browne, K.C., for the East Hull Gas Company, and a poignant cross-examination of the witnesses for the Hull Corporation, have had no effect, before the Police and Sanitary Committee of the House of Commons, in ending the progress of the compulsory sale section of the Bill promoted by the Corporation. What has happened was the expected issue in the House of Commons. Municipalization is of the policy of the majority of the Lower House, as now constituted; and all disinterested readers of the report of the proceedings before the Police and Sanitary Committee on this Hull measure will, on perusing the words employed by the Chairman, in delivering the decision, agree with us that "any excuse," in the prosecution of that policy, is apparently regarded as "better than none." If we accept the assertion that the Committee had carefully considered the case point by point as it proceeded, and if we stretch our generosity to trying to believe that the Committee were not swayed by any predilection for municipalization, then we say the Committee failed to appreciate the facts put before them, and their decision will not, on the pure merits of the case, meet with the approbation of a multitude of more competent judges. The Company, on this occasion, called no evidence; and, under the circumstances, we are not disposed to question their determination in this matter, for if the conduct of their case up to the point of Mr. Balfour Browne's cogent criticism and appeal was not sufficient to persuade the Committee in their favour, then nothing that the Company's witnesses could have said would have made the slightest difference. The Company have, in other words, reserved their case for the House of Lords. It is a contest of far-reaching importance—an importance that is not bounded, as we have said before, by the Company's territory of supply; and we trust, in the common interest, more especially now that the objectionable clause has been expunged from the Bill which most unjustly proposed to deny any allowance for compulsory sale, that the Company will not listen to any overtures for purchase, but will take the verdict of the final tribunal. As Mr. Balfour Browne says, a Gas Company's statutory concession should be limited only by bad behaviour; and there has never been a purchase case yet of a statutory gas undertaking in which Parliament has pronounced to the contrary. In the Pontefract case, it was proved conclusively there had been a want of enterprise on the part of the Company, though in their latter days there was evidence of their having turned over a new leaf. It will be for the House of Lords in the present instance to reverse the (we can afford to mildly call it) mistaken decision of the Police and Sanitary Committee of the Commons.

The Chairman of the Committee stated that they had heard from the Corporation witnesses that the management of the Company had not been all that it might have been; and that they had expected the Company would have called rebutting expert evidence. As, however, that evidence was not forthcoming, the natural conclusion, he added, for the Committee to draw was that the Company's expert evidence would only have strengthened that of the Corporation. We fail to see what clearer evidence the Committee wanted that the Company had served their customers well through good administration—so well, in fact, that it would have been to the advantage of the consumers in the Old Town of Hull if the Company had been supplying them, instead of the Corporation. All the charges of mismanagement are summed up in this: The Company until 1901 issued their capital to the shareholders at par; and it is suggested that the consumers suffered in consequence. What the Company did they were entitled to do under their Act; and the fact remains that, notwithstanding, the price charged for gas by the Company has been considerably lower than that of many companies who have issued their capital by auction or tender. As important a point as how the capital is issued is how it is expended; and the price at which the Company have been supplying gas shows that the capital has been, in the circumstances of the undertaking, well and wisely spent. It is rather late in the day, now that the Company can no longer issue capital at par to the shareholders, for the Corporation to complain about it. If the Corporation had had any enterprise—if they had deemed before that the interests of the gas consumers were being affected by what the Company were doing—why did not they years ago protest against it, and try to induce the Company to alter their method of issue before it was too late? We have no evidence that they interested or troubled themselves the slightest in the matter. We repeat that what the Company were doing was, in their case, by the authority of Parliament, perfectly legal. But if the Company had been doing what the Corporation are doing in the case of their water undertaking—spending capital out of revenue—that would have been illegal. Then there was the question of leakage. It was 7·9 per cent. in 1906; and 12 per cent. in 1902. The reduction, if anything, is evidence of the Company's earnestness in bringing about improvement in this respect. Another complaint was that the Company were not supplying fittings with prepayment gas-meters. That is a policy that does not meet with our approval; but it is a policy that can be easily remedied, with the extended powers conferred upon the Company under their 1906 Act.

Those are the complaints that were advanced against the Company. But the real index as to whether or not their management has been in the interests of the consumers is the price charged. It is now 2s. per 1000 cubic feet; and it was 2s. 4d. before the last reduction. The Corporation are complaining of the Company making their last reduction, regarding it as something quite abnormal and unjustified by the last published accounts. The Corporation take credit to themselves for a remarkable amount of prescience in this matter; but it may be submitted that the Company are in a better position to judge of the justification for the reduction and the prospects of the business under the reduced price than can be the Corporation. It is, to say the least, irrational to complain of the Company not having studied the interests of the consumers in one respect, and in the same breath to complain of them when they are studying the interests of the consumers in the matter of price. The fact is the Corporation are charging 2s. 6d. in the Old Town, and they are doubtless not best pleased to have their 2s. 6d. brought into comparison with the Company's 2s., and yet unwilling to forego at present any part of the 2s. 6d., although the gas for which they charge that price is supplied to them in bulk by the British Gaslight Company at 1s. 6d. For the East Hull Company, the price of 2s. is no new thing; it was down to that figure throughout a period of three years some time since—long before the Corporation contemplated purchase. What, too, the Company have done in reverting to the 2s. price, in anticipation that prospective increase in business and economies and improvement in working would justify them, is precisely the ground upon which the South Metropolitan Company made their last reduction to 2s. The East Hull Company's carbonizing returns also stand well, and so does the cost of gas into the holders.

There is really nothing for decision in this case but the one question as to whether or not it would be to the public interest that transfer should take place. On the evidence, it is abundantly clear that it would not be so. The cheapest gas supplied in Hull is through private enterprise; the dearest is through the Corporation. It is better, too, in the interests both of electricity and gas consumers that—the supply of electricity being in the hands of the Corporation—the competition should be kept totally distinct. Then the consumers have no efficient control over the Corporation, as they have over the Company through the Corporation. The

Corporation want money to "aid" them with the rates. The more money obtained in this way, the experience is, the greater the extravagance of local spending authorities; so that as a matter of fact the rates are not "aided." The gas consumers have to provide the money so taken, in addition to the requirements for sinking fund and interest. There we have unequal taxation, unless the oil supply is municipalized as well, and then electricity and oil be made to contribute to the rates, in proportion to the capital employed, equally with gas. The Hull Corporation have been running the electricity undertaking for some years now; but it has not contributed anything to the rates. And this is under the management of the Corporation to whose tender mercies it is proposed to confide the gas consumers of East Hull. The fact of the matter is, the Corporation have already got as much as they can attend to in the legitimate work of local government. Their hands are already full. With hands full, the increase of responsibility cannot bring an increase of efficiency in administration. The undertaking of more obligations must produce some attenuation of efficiency throughout the whole administration; and to this we hope the House of Lords will sternly decline, in the circumstances, to be parties. If the Company had not been offering cheap gas to all who chose to take it, and the Corporation had been doing better in the Old Town than the Company, our views would have been considerably moderated.

Gas Coke or "Coalite."

An inspired article in the "Manchester Courier" of the 12th inst., states that, up to that time, it had not been possible to comply with repeated requests for further information respecting "Coalite." Then follows this explanation: "Now, however, that the patent rights of the invention have "been fully protected on the Continent and elsewhere, we "are in a position to publish some interesting details relating to the remarkable invention." We are glad to learn that there is no longer ground for the withholding of information as to the "Coalite" process for fear of endangering the patent rights; and our wonder is that the sponsors of "Coalite" should have elected to reveal details of a technical process to a popular journal rather than to the technical press, which would have been more competent to appreciate their import. The meagreness of the "interesting details" divulged to readers of the "Manchester Courier," partially reconciles us to receiving them at second hand; and we await with great interest the fuller particulars which, now "that the patent rights of the invention have been fully "protected on the Continent and elsewhere," should (as was suggested in the "Journal" a fortnight since) be immediately forthcoming. We therefore wonder why (as our Manchester contemporary was informed) "at present it "is not considered judicious to explain the exact nature of "the process;" and we cannot agree that "that is a matter "of secondary importance compared with the result that "has been achieved." It is true the result so far achieved appears to be of quite trifling importance, but greater achievements are more than hinted at. Let us review them pending the time when it may be "considered judicious" to explain the exact nature of the "Coalite" process.

The information given to the "Manchester Courier" was derived from Colonel C. Allen, of Sheffield, the Chairman of the Directors of Henry Bessemer and Co., Limited, "who "has taken a prominent part in placing the invention before "the world," and Mr. F. W. Salisbury Jones, a Director of "Coalite, Limited." The journalist, with highly creditable acumen, observed to these gentlemen that "Coalite" resembles coke so closely that he would not be able to distinguish between them! It was highly essential to divert him from so awkward a line of inquiry, and with an airy observation that "coke takes 48 hours (!) to produce, whereas 'Coalite' "only takes 6 hours," his informants turned aside to enlarge upon the supply of electric power from the waste gases of the "Coalite" works. It thus appears that "Coalite" is produced in precisely the same time as gas coke, from which an observant journalist cannot distinguish it! Plenty of comparisons were made to him between "Coalite" and coal, but not between "Coalite" and coke; and the statement that coke takes 48 hours to produce, indicates that the "Coalite" makers are anxious to divert the attention of prospective users of their product from gas coke, and do not stick at the utterance of a partial truth in pursuance of their object. It is true Sir William Bailey has now hinted that "Coalite" will be cheaper than gas coke, but at present in London broken gas coke is retailed at four-fifths the price of "Coalite," and is fully as commendable as a domestic fuel. In this connection, we may quote from Colonel Allen's words to the journalist: "The law of supply and demand "is the factor which will always determine the price of "'Coalite' when it comes into general use; and the work-"ing man can depend on it that, when he buys a sack of "'Coalite,' he will get an article that is clean in every "respect, as there are no oily substances in it." The working man and others have already the same guarantee in respect of a sack of gas coke; and as the production of gas coke is determined not by the demand for it, but by the demand for gas, it is obvious that the price of the closely-allied fuel "Coalite" will, in fact, be determined by the price of gas coke. When the total supply of gas coke has been sold for whatever it will fetch, as at present, "Coalite" may hope to meet any further demand there may be for a smokeless solid fuel. People who will not use gas coke will not for long use "Coalite." The advertising of smokeless fuel, whether "Coalite" or other, must, however, ultimately serve to draw further attention to the utility of gas coke and gas as domestic fuels, and to that extent it should really be beneficial to the gas industry.

Gas coke will continue to control the price obtainable for smokeless solid fuel for domestic grates, unless or until "Coalite" becomes, like gas coke, a bye-product of another manufacture. But the "gases extracted" are spoken of as the "residue" of "Coalite" production; and so we may assume that "Coalite" is the staple product, and gases, ammonia, "petrol," and whatnot, bye-products. The gases from "Coalite" factories are, we learn, to produce all the power necessary for the electric current and lights and power of the City of London and Manchester. In regard to London, plant is to be put down to produce three million tons of "Coalite" per annum, as it is not hoped at first to displace more than three out of the thirteen million tons of coal said to be used every year in the Metropolis for domestic, steam-raising, and manufacturing purposes. The production of "Coalite" is to be licensed, directly the big Company is formed, in all the towns and villages of the country, and a royalty is to be charged for the use of the invention. To this we may remark that no royalty can be charged on the production of gas coke or gas, but only on the use of a particular process for producing either, which process must, to secure its royalty, be either technically or industrially superior to pre-existing processes for attaining the same ends. Patent rights are granted in Germany, as well as in England and other countries where a less thorough search is made in regard to originality, for processes which are original in respect of the means of attaining a desired end, and not in respect of the end to be attained. Such processes may be original, highly ingenious, and even scientifically sound; but industrially they may, and very commonly do, fail to compete with other processes which yield the same products. No patent rights confer industrial success on a process.

Colonel Allen incidentally stated "We shall issue our prospectus in about a month." Was it really necessary, or shall we say "judicious," to mention this?

Gas Coal Prices.

Although anonymous correspondence on matters of such a nature as gas coal prices is not encouraged, we have satisfied ourselves that there are sufficient grounds for not disclosing the identity of the correspondent writing on the subject to-day (p. 167). His connection with an important Durham colliery concern induces the opinion that the letter is not merely the expression of personal views; and let us say at once that the strength of the letter is in the tail and not in the body. The opening lines of the second paragraph will not in the slightest degree deter those who have protested—by speech, writing, or action through their contracts—against the inflated prices asked for gas coal by Durham owners, from continuing their line of procedure if need calls. Our correspondent suggests that such protests only have the tendency of "getting the colliery owners' backs up." Surely this is a free country; and the Durham owners evinced no hesitation in "getting the backs up" of the majority of administrators in the gas industry. They cannot have it all their own way; and it is childish to get angry because, when they set the tune, the gas industry refuses to dance to it. The sentences referred to have to be read with the mollient ones at the end of the letter. The Durham coalowners are

too sensible of the importance of the business of the gas industry "to get their backs up," and make permanent enemies of gas coal buyers. "When London comes next "year, they [the Durham sellers] will," writes our correspondent, "doubtless give London the first chance of buy- "ing. Although the coalowners here have not secured "their usual quantities, they have the greatest respect for "the London Companies, who are justified in buying in "the cheapest market." There is more wisdom in writing thus—although the favour of the coalowners is not sought, but merely fair and considerate treatment to large, regular, and (formerly) certain customers—than in talking of "get- "ting the colliery owners' backs up." But the olive branch held out for the future will have to be accompanied by something more tangible than words.

Regarding the point as to foreign gas coal buyers, the Durham owners must not look upon them as sure fish for their nets. The managements of those foreign gas undertakings are close students each week of all matters affecting British gas administration; and there is bound to be a reversing of positions when they fully comprehend the attitude of British gas undertakings over this coal question. Instead of the foreign buyers helping to set the price for British gas undertakings, the latter will set the price for the former; for the foreign buyers, if they are wise, will ask themselves why, if British gas undertakings can afford to resist extravagant demands, they cannot do the same. Depend upon it, what happened in the case of the Rotterdam contract (notwithstanding what our correspondent says) is only the beginning; and other buyers will not be slow to take that action into consideration in connection with future transactions.

The reports from other coal centres—Yorkshire especially—satisfy us that they are reaping a large benefit from the course of events this year. One report from Durham says it is believed that negotiations are likely to be opened again with London. The Durham owners know well enough by now the only terms on which the London Companies are likely to consider the reopening of business negotiations. To those owners, the firm stand that has been made has been somewhat of a surprise.

Rewarding Workmen for Valuable Ideas.

THE workman, with his great and ever-accruing practical experience—living daily in his work—is, if quick wit and intelligence are of his parts, in a specially favourable position for detecting weakness and suggesting improvement in plant or process; and in no large industrial works should the product of that—shall we call it?—latent power be lost for the want of proper encouragement, and by the meeting of advantage by reward. Many things that have developed to an amazing greatness have had, and will have again, very small beginnings; and some of our greatest engineering achievements have had their birth in the brains of those whose practical training was obtained as handicraftsmen. This fact is, of course, well known; but it is mentioned here as it seems to be forgotten in some works, in which the men are regarded as mere machines, or as beings with sterile brains incapable of any production on higher lines than those appertaining to the work they are employed to perform, or as beings from whom any suggestion ought to be treated as an act of presumption and even of insubordination. This is no overdrawn picture; it is something that we know, both from observation and report, does exist. It is firmly believed, however, that works to which this applies are of the minority and not of the majority. Workmen, as other men, vary in intellect; but we cannot tell until that intellect is given scope how far it is capable of really useful expansion. Therefore, we say that all workmen, of whatever rank, should be given the opportunity for proffering suggestions that their practical experience assures them would be an improvement, that the exercise of their ingenuity should be encouraged, and that the fruits of that ingenuity should be suitably rewarded. For if the suggestion produces economy or increase, or heightens efficiency, it partakes of the nature of invention; and productive invention should always be rewarded.

The idea of picking (for self-enrichment) workmen's brains without suitable reward must be repugnant to all honourable employers, especially when the men give in the work they are engaged to do a fair day's return for a fair day's wage. The Bermondsey Borough Council are not among such honourable employers. They appear to have a very hazy notion of the way to gain and retain good men in their employ, and to realize from them the best and most profitable service. The Council are of those who do not agree that the ingenuity of their employees exercised over and above their common duties to the pecuniary advantage of the borough, should be in any way rewarded. A scavenging ganger and a district superintendent brought before the late Works Committee of the Council a scheme whereby the cost of scavenging the borough is reduced, according to the present Works Committee, by some thousands of pounds per annum. A return by the Borough Surveyor sets out the saving last year as £904. Whether the thousands or the hundreds are correct, the exercise of their intelligence and ability by the two men produced something that had not been thought of before by the Borough Council or their superior officials, and that something has saved considerable annual expenditure. It will hardly be credited, however, that a recommendation by the Works Committee that the two men should be rewarded by the modest sums of £25 and £15 respectively was, on being brought before the Council, negatived by one vote. We rejoice that this act of meanness did not occur in any gas undertaking. Though we are out-and-out for economy with efficiency in local administration, such parsimony looks remarkably foolish against past extravagance in Bermondsey. What encouragement after this have these or any other men in the Council's service to exercise their intelligence and talents in the interests of the ratepayers? So far as their material well-being is concerned, the scavenging ganger and the district superintendent would have been in just as good a position to-day if their suggestion had never been made, and ratepayers had not been saved an annual unnecessary expenditure.

This instance of a great mistake in administration comes appropriately; for it was only the other day that Mr. Harold Woodall was telling us, in his Presidential Address to the Southern Association, of the benefits that had accrued at the Bournemouth Gas-Works from the institution of a "Sug- "gestions Box," with reward to those who made suggestions, and a special prize to the man whose suggestion during a year was adjudged to be the best. The method is good; but the correctness of the plan of apportioning the reward (we are subject to the correction of experience) is open to a little doubt. All who make suggestions are in some way rewarded; but we are not at all sure that this may not encourage frivolous suggestions for the sake of participating in the reward, and, the sum voted by the Directors being a definite one, the more suggestions of no intrinsic merit that are made, the more slender must become the reward for those whose ideas are of value. The principle of the "Suggestions Box" is worth adoption in all works; but the method of reward might perhaps be revised. It has been suggested as being worth considering whether it would not be of greater advantage to the men earning reward to have instead advancement in wages and position. But we see a limit to that idea. In (we believe) several other gas-works, recognition is made of valuable suggestions on the part of the men. It is many years since that a system was introduced at the South Metropolitan Gas Company's works by which, for all plans devised by workmen that actually resulted in improvement or economy in working, a lump sum payment was made according, if we recollect rightly, to merit. We have not had any news of that scheme of late, and should like to have, both from the South Metropolitan Company and other gas concerns with such systems in vogue, further information as to how they fulfil their purposes.

What are those purposes? They run along exactly parallel lines—one representing benefit to the concern engaging the men, the other to the men themselves. The encouragement to the men of reward for invention of any kind creates scope for mental activity; it is an incentive to advancing beyond the stage of the mere obligation to perform a prescribed amount of work for a given rate of pay, and to converting superficial interest into something very much deeper. The intellectual status of the man who thinks is much higher than that of the man who does not; and when, by thinking over his work, he is productive beyond the ordinary scope of his duties, he should enjoy a share of the profit. On the other hand, the employing concern not only participates in the profit, economy, or whatever is realized, but it participates in the advantages of the improved men—improved in character and intelligence—produced by the system. The experience is that the men are responsive to encouragement of this kind; and it is a system that might be adopted with advantage in all gas undertakings and other industrial

establishments. Profitable germs may lurk in many an unexpected brain; but those germs may lie dormant and remain undeveloped without some little incitement. There need be no pay if no value accrues; but when value does accrue, there should be reward, and not, as in the case of Bermondsey, discouragement. All industry is the creation of brains and capital; and when a man, no matter of what rank, contributes one or the other, he should get part of the resulting profit according to the measure of the contribution.

Local Authorities and Depreciation.

The necessity for local authorities, especially those controlling electricity-supply undertakings, making proper provision for depreciation, has so frequently been emphasized in our columns, that we willingly give space elsewhere to some extracts from a lecture on the subject recently delivered by Professor Lawrence R. Dicksee, F.C.A., to the Chartered Accountant Students' Society of London, and also to similar Students' Societies in the Provinces. Professor Dicksee acknowledged that the subject was one of the most debateable of the numerous questions in connection with accounts which require solution by auditors in the every-day discharge of their duties, as well as when they are called in to advise upon questions of financial policy. But he thought this only made it all the more interesting, especially to students. In dealing with it, it will be seen that he has done so from a scientific, and not from a political, point of view. We cannot here do more than call attention to the lecture, which deserves careful perusal. The table showing approximately how the expenditure on a municipal electric lighting works would probably be divided as between different classes of assets, and his explanatory remarks on it, are specially interesting. Before leaving his subject, Professor Dicksee stated briefly how, with but very slight present sacrifice, material advantages might be secured in the future by gradually reducing the outstanding indebtedness of the various trading departments. This, he said, was a problem in practical finance which presented points of considerable interest, and therefore was well worthy of more careful consideration than it appeared to have received.

Passing of the Paris Gas Company.

In another part of the "JOURNAL" will be found an abstract of the report presented by the Liquidators of the Paris Gas Company at a general meeting of shareholders held a few weeks ago. In it they literally "give an account of their stewardship," for, as may be remembered, the Company's concession expired on the 31st of December, 1905, and the Liquidators carried on the undertaking last year pending the decision of the Municipality as to its future control. Even when this was arrived at, a concessionary had to be found; and though one has been appointed, he will not enter into possession for some weeks to come. Consequently the business is still being carried on by the "old firm," so to speak, subject to a month's notice to quit from the new proprietors. This is the present position of affairs. With regard to the report, it, of course, covered the year ending the 31st of December last. In that period, the Liquidators transferred to the Municipality the Company's share of the assets for the sum of 90,000,000 frs.; and they had this amount, *plus* the accrued interest upon it, 8,232,000 frs. profits, and 210,447 frs. brought forward—in all, 99,337,691 frs.—to distribute among the proprietors, which worked out to roughly 295 frs. 64 c. per 250 fr. share. The other partners in the concern—the Municipality—drew 20,618,940 frs. (£824,758) as their portion of the profits. The report contains two features to which attention may be specially directed. In the first place, though the Liquidators lost the suburban supply, which represented in 1905 about 10 per cent. of the total, the falling off last year was only 5·5 per cent., owing to an increase of 19,094 in the number of consumers; while the day consumption was actually greater—42·56 per cent., against 41·16 per cent. The other feature is the retrospect of the working of the undertaking during the fifty years of the concession, which the Liquidators thought it would be interesting to give before the Company was finally wound up. In the first year of the concession (1856), the Company sold about 1671 million cubic feet of gas, and their revenue was £412,380; in the last year, the figures were 13,944 million cubic feet and £4,234,991. In the course of the half century, the fortunes of the Gas Company necessarily varied with the times; but, on the whole, they were exceedingly good. In only ten years—two being 1870 and 1871—was there a falling off in the consumption of gas compared with the preceding year. The dividends began with 40 frs. per share, and only once (in 1871) fell below this figure; while in one year they were 82 frs. 50 c. It has all along been "good business" for the shareholders. At the same time, the City has not come off badly. From 1869 onwards they received a share of the profits in addition to the rent of the subsoil occupied by the mains and the tax of 5¼d. per 1000 feet on the quantity of gas sold; and altogether a sum of something like £23,000,000 sterling has passed into the Municipal Exchequer in respect of the gas supply. The only sufferers have been the consumers, who until 1903 had to pay 6s. 9d. per 1000 feet for the gas they used so liberally. This state of things, however, has now come to an end. The new concession is for twenty years only; and it is terminable at any quinquennial period. Moreover, the present price of 20 c. per cubic metre (4s. 6d. per 1000 cubic feet) is to continue, and the charges for the hire of fittings, &c., are reduced. Altogether, therefore, the consumers will not have cause to greatly regret the passing of the Paris Gas Company, though under the new *régime* they will pay for their gas a price which compares very unfavourably with that charged by the majority of English gas companies and gas-supplying corporations.

PERSONAL.

Mr. PHILIP HOLMES HUNT, the Engineer of the Melbourne Gas Company (son of Mr. Charles Hunt, M.Inst.C.E.), is being married in Australia to-day.

Mr. A. S. H. HELPS, who was formerly with his brother, Mr. James W. Helps, at the Croydon Gas-Works, has been appointed Manager to the Chippenham Gas Company.

The marriage took place last Tuesday, at Peterborough, of the Rev. R. F. BURNETT, formerly Curate of All Saints' Church, and only son of Canon and Mrs. Burnett, with Miss SARAH BARTON, only daughter of Mr. and Mrs. John Barton, of Peterborough. The marriage ceremony was performed by the Rev. G. M. Hutton, the Vicar of St. Mary's, Brighton (to which church the bridegroom is at present attached); and Canon Ball, R.D., delivered an impressive address. A reception followed at the residence of the bride's parents. There was a handsome collection of presents, numbering over 200. The staff at the Peterborough Gas-Works gave a massive marble timepiece and pair of bronzes. The "Evening Star" Lodge, of which Mr. Barton is a member, sent the bride an inlaid, ormolu mounted, writing table.

Treatment of Ammoniacal Liquor with Sulphate of Lime.

The employment of sulphate of lime has been recommended to recover the ammonia in gas liquor when large quantities of sulphuric acid are not available. In some experiments referred to in "L'Engrais," a sample of liquor containing 2·6 grammes of ammonia per 100 c.c. of water was agitated with sulphate of lime, and after settlement the clear liquid was run off. It was found possible to recover 97 per cent. of the ammonia in this clarified solution from the raw liquor—*i.e.*, 17 per cent. by boiling, and absorption of the liberated ammonia with sulphuric acid, and 80 per cent. in the form of crystallized ammonium sulphate by concentrating the residual solution. In order to entirely dispense with sulphuric acid, the liquor was first treated with sulphate of lime; then the solution was run off and treated with ferrous sulphate, and the latter removed when precipitated—the clear solution being subsequently concentrated to obtain crystallized sulphate of ammonia. By working in this way, 95·4 per cent. of the total ammonia was recovered.

Cost of Electricity from Various Sources.

At a meeting of the New York Section of the American Electro-Chemical Society, Professor C. E. Lucke read a paper in which he considered in detail the various factors entering into the cost of the energy consumed in electro-chemical works. The author (says the "Electrician") discussed the electric generating station in which the source of power might be water, oil, steam, or gas; and the operating cost was estimated from values found to exist in practice. The following table was presented, showing the cost of electric energy obtained from various sources, the values being in pounds:—

—	Water.		Oil.	Steam.		Gas.
	Min.	Max.	Mean.	Min.	Max.	Mean.
Initial cost per kilowatt . . .	15·0	40	43·40	22·0	30·0	54·0
Investment cost per year, do. .	1·5	4	4·34	3·3	4 5	5·4
Operating cost per k.w.-year. .	0·2	1	11·38	10·5	10·5	7·7
Total cost of energy per k.w.-year	1·7	5	15·72	13·8	15·0	13·1

NOTES FROM WESTMINSTER.

AFTER the Easter recess, the Police and Sanitary Committee, with Mr. Corrie Grant as Chairman, were the first to get to work.

East Hull Gas-Works Purchase.

The Bill with which they recommenced their deliberations was that of the Hull Corporation; and being an omnibus one, containing matters that are specially referred to this Committee, although the only opposed matter was that of the purchase of the works of the East Hull Gas Company, this particular question had to be discussed before this Committee instead of before a "Select" one as would otherwise have been the case. When the Committee and the opposing forces were assembled on Tuesday morning, it was seen that something like a balance of forensic and gas expert power had been produced. On the promoting side, there were found the Hon. J. D. Fitzgerald, K.C., Mr. Ram, K.C., and Mr. W. J. Jeeves; and the technical witnesses with them were Mr. E. H. Stevenson, Mr. Charles Hunt, Mr. F. J. Bancroft (the Corporation Gas and Water Engineer), and Mr. William Cash, F.C.A. Opposing for the East Hull Gas Company (whose property the Corporation are coveting, not because they hope to sell gas any cheaper, but because they hope to extract something from the gas consumers to supplement their present sources of revenue for general purposes) were Mr. Balfour Browne, K.C., Mr. Honoratus Lloyd, K.C., and Mr. A. M. Paddon. The technical advisers on this side were Mr. Corbet Woodall, Mr. W. A. M'Intosh Valon, and the Company's own Engineer, Mr. J. Holliday. The parties were strong in their representation; the Committee in their allegiance to the doctrines of municipalization. If there is one thing more than another that is apparent from the verdict of the Committee on the evidence laid before them and the speeches addressed to them by Counsel, it is that no tribunal can be selected from a party to impartially adjudicate upon a matter which forms one of the chief components in the policy of that party.

Municipal Management.

The arguments occupied the sittings of the Committee on Tuesday and Wednesday, and clauses were further mentioned on Thursday. The Corporation have been busy, since the promotion of the Bill, looking into the Company's history. The Corporation had, it may be inferred, previously been unmindful and careless in keeping watch over the Company; for that the Company were guilty of any misdeeds sufficiently grave to bring before a Committee of Parliament was certainly not present to the minds of the Corporation when they appeared in opposition to the Company's Bill last year. Then they preferred no complaint as to the Company's working; and those that the Corporation make have about them a very fine superficiality. Now we heard in Mr. Fitzgerald's opening speech of the Company's "sleepy management, want of enterprise, and a want of pushing business." The Corporation have been guilty of sleepy management and want of enterprise in not having made these discoveries before—that is to say, if they were worth discovering before this Purchase Bill was promoted. There is no doubt, having regard to what the Town Clerk said, that there are individuals in the Corporation who are regarding this promotion as a second step in a larger policy—the larger policy comprehending the absorption of the Hull works of the British Gaslight Company. That would mean rather a big thing; but, verily, nothing is so big that it cannot in these days be covered by municipal imagination, and nothing is so big or technical that a municipality cannot do better with it than private enterprise. That, at all events, is what we are taught, or are asked to believe, in these times; but the results of the practice of these teachings do not allow belief to take strong root before it perishes. Of course, a great deal was said to show how cleverly the Corporation manage their trading undertakings—there is no want of enterprise about them! The Corporation have, we are assured by the evidence of their officials, very much at heart the interests of the customers of their undertakings; but it is also gathered that they have still closer at heart the interests of the Corporation coffers. The evidence of the Town Clerk, Mr. Stevenson, and Mr. Bancroft, pointed to this very clearly. The Corporation not only make the water consumers pay interest and sinking fund, and provide capital for extensions, but they have to contribute largely to the rates, in addition to paying the ordinary rates. Since 1893, the water consumers have, through the revenue, provided £110,000 for capital expenditure. In the case of water, there would not be much reason to grumble at this, if it were not that these same tolerant consumers had had extracted from them some £36,000 for the general rates the last six years. How in the name of Justice can this be defended? The Corporation witnesses did not tell us. There has been borrowed for the electric lighting undertaking £325,110; but the Corporation have only succeeded with that large capital expenditure in putting to depreciation £2817, and in building up a reserve of £13,200. Nothing from this undertaking has gone to the rates. So that, under Corporation management, the consumers of one commodity have to contribute aid to the rates; the consumers of another commodity go scot free. The comparison could be carried further from the trading undertakings of the Hull Corporation. It all, however, shows the inconsistencies of municipal administration of trading enterprises, and the heavier impositions in the matter of a town's expenditure that such trading brings upon one section of ratepayers as compared with another section. The Police and Sanitary Committee were quite oblivious to these things, and also to what we fancy they could have found by inquiry, that, while the Corporation have been extracting funds from the customers of certain of their trading concerns in "aid" of the rates, the rates have not, in consequence, been on the decline. If they have, then Hull should be held up to the country's admiration. It transpired in the evidence that, on a poll of the ratepayers over the gas-works purchase question, only 3143 were in favour and 2427 were in opposition; but these numbers only represent about one-tenth of the voters on the register. The Corporation action cannot therefore be taken as a "mandate" from the ratepayers. It is the old tale of the indolence of ratepayers giving a loose rein to municipal councillors.

Research and Discovery.

Looking into the Company's affairs, the Corporation, it transpired, had discovered that up to 1901, the Company had used the sanction that Parliament had given them of allotting new issues of capital at par among the shareholders. The same thing was done by the Commercial Gas Company until quite recent years. It is thought that this is a fault of which the Corporation can justly complain. The Committee, however, did not take into account that the Company can no longer so issue capital under their 1906 Act. Such capital will in future have to be issued in accordance with the practice of modern times. But, however the capital was issued, the Company have taken rank for years past among the low selling-price companies, so that, by comparison, the consumers have nothing much to complain of. Cheap capital does not always inure to economical construction. Mr. Bancroft correctly said that the average capital per million cubic feet was a fair one for the Company; but he quoted some other companies that had lower averages worked out on the same basis. It would have been to the point if he had stated whether the plant of those companies was equal to that of the East Hull Company, and whether their charges for gas were as low. Then the Committee would have known whether method of raising capital or administration had told most to the benefit of consumers in the cases quoted. Another charge against the Company was that the leakage was 7·9 per cent. last year; but as it has been reduced by 4 per cent. since 1902, the Company are going the right way to work to bring down the unaccounted-for item. The Company it was also complained have not been supplying fittings with their prepayment meters. The modern prepayment clauses appear in their Act of 1906, so there again we have a condition that can now be altered. It would be of interest in this connection to know whether municipal electricity has had any larger adoption in the district of the British Gaslight Company than in that of the East Hull Gas Company. Cheap gas is the best incentive to business; and the price of gas in East Hull is 2s. now, was 2s. 4d. last year, was 2s. 6d. previous to that, and for three years some time since it was 2s. But the Corporation are selling gas in the Old Town at 2s. 6d.; and they are wroth with the Company for robbing themselves of revenue by selling at 2s. The points in the case of the Corporation certainly refuse to harmonize nicely. The Company, it was shown, are working well, selling as they do 10,491 cubic feet of gas per ton of coal carbonized. These are the alleged bad and the admitted good points that came out in the evidence of the Corporation witnesses.

A Verdict on Side-Issues.

Under the circumstances, Mr. Balfour Browne found himself somewhat at a loss for any substantial charges to which to reply when he rose to address the Committee on Wednesday; but he made some weighty remarks on the question of municipalization. He laid it down as a rule recognized by Parliament that a Statutory Gas Company's concession should only be limited by bad behaviour; and he strongly contended that, if municipalization is to be adopted as a general policy, it should be on a Public Bill, and not on a private one. But all his eloquence had no effect; for the Committee took the unjudicial course of looking only at the flimsy complaints brought against the Company, giving them no credit for their excellent record in the matter of price to the consumers, overlooking the greater scope that the legislation of last year gives to the Company in serving the consumers, and shutting their eyes to the injustice of municipalization as between consumers and ratepayers as is easily illustrated by Hull—and so placated their consciences into passing the preamble of the Bill. The Company called no evidence; and they did not stay to discuss clauses. The evidence will be laid before a Committee of the House of Lords at the proper time. One thing the Police and Sanitary Committee showed good sense upon, and that was to remove from the Bill the clause which purposed to rob the Company—another instance of municipal unfairness—of any allowance for compulsory purchase. A clause which appears in the Bill that has some novelty, and was inserted to pacify an outside authority, is to the effect that the Corporation shall not appropriate more than 5 per cent. per annum to the relief of the rates in Hull. After providing for principal and interest, if they do their duty to the consumers and undertaking, the Corporation ought not, assuming they get possession of the concern, to have 5 per cent. to spare to transfer to the town's exchequer.

Last Wednesday, at Weston Church, Crewe, Mr. MAURICE L. WILLIAMS, son of Mr. John E. Williams, of The Hollies, Chorlton-cum-Hardy, was married to Miss MABEL HUNTER, youngest daughter of Mr. Samuel Hunter, of Shavington Lodge (formerly of Salford). The village was *en fête*, triumphal arches being erected between the lodge and the church.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 183.)

All factors in the Stock Markets last week (with perhaps one exception not of commanding importance) were favourable; and yet somehow or other the result was only disappointing. The opening evinced a little uncertainty, and there was still an amount of liquidation in Americans going on; but things improved distinctly the next day. A fall in the Bank rate was regarded as a certainty, and buyers were encouraged. But still business did not become lively; and on Wednesday things became so quiet that prices had begun to droop before the close of the day. On Thursday the anticipated reduction in the Bank rate, albeit small, was an accomplished fact. But this did not quicken the pulse of business; and the general tone was just a little dull. Friday found and left things in much the same mood; but there was a rather better tone in Railways. This was maintained on Saturday, though operations were still at a low ebb; and prices were inclined to pick up a little. The fact of its being account week tended to limit the volume of fresh business; but it gave rise to no anxiety, and the settlement was not formidable. In the Money Market, the supply was always abundant, and rates, both for short loans and for discount, became steadily easier. The Bank rate, which had been fixed at 5 per cent. on the 17th of January, was lowered to 4½ per cent.; and, if no adverse factor occurs, a further reduction may be looked forward to at an early date. Business in the Gas Market was very moderate. Perhaps the most salient feature was the smallness of the volume of dealings in the large issues which usually make up the bulk, and the unusual number of transactions in one or two of the smaller foreign companies. The general tendency was good; and all quotations that did move, moved upwards. In Gaslight and Coke issues, the ordinary was only moderately dealt in, and at very even and steady figures—viz., 95½ to 96½. The secured issues were quiet; the maximum realizing 88⅝ and 89; the preference, 105 and 105¼; and the debenture, from 83½ special to 85. South Metropolitan was firm; and the buying price advanced. Transactions were marked at from 120¾ to 122½. Commercials were quiet; the 4 per cent. changing hands at 108½ and 109, and the 3½ per cent. at 105. In the Suburban and Provincial group, business was done in Bournemouth "B" at 16⅛, Brentford old at 251 and 252, Brighton original at 222½, North Middlesex at 20, South Suburban at 122, and Tottenham "B" at 102 and 102½. Very little was done in the Continental Companies; but Imperial was 1 higher, with business done at 177 and 178½. Union was not touched; and European fully-paid marked 24½. Among the undertakings of the remoter world, Bombay old changed hands at 7 and 7 1/16, ditto new at 5⅛, Melbourne 5 per cent. at 100½, ditto 4½ per cent. at 101, Primitiva ordinary was active at ¼ advance, and with dealings at 7⅛ to 8⅛, ditto preference marked 5 1/16 to 5 3/16, ditto debenture 95¼ and 95½, River Plate 13⅛ to 13½, and ditto debenture 95¾.

ELECTRIC LIGHTING MEMORANDA.

Flame Arcs and Shop Window Lighting—British Electrical Engineers as Inventors—Metallic Filaments—The Status Quo—Workhouse Lighting—The Technical Man and Untechnical Councillors—Municipal Electrical Contracting.

In dealing with the lighting of Oxford Street a short time ago, we called attention to the great assistance that the illumination of the magnificent shop windows on either side rendered to the electric flame arc lamps in the centre of the roadway, producing by the combination a brilliant show and a greater uniformity of illumination than is apparent when the shops are unlighted. On March 26, too, we pointed out that flame arc lamps for shop window lighting are not having the effect that tradesmen who have adopted them had expected, inasmuch as, while the lamps attract attention from a distance, they so dazzle the eyes of would-be inspectors of the goods in the windows, that the object of having a window at all for the display of goods is frustrated, and the shopkeeper cannot find a *quid pro quo* in his profits for the additional expense to which he is now put in comparison with the times of cheap but efficient illumination of his shop windows by incandescent gas-lamps. Our views as to the great part that shop lighting plays in the illumination of shopping thoroughfares, and the unsuitability of flame arc electric lamps for shop window lighting, have corroboration in at least two of our electrical contemporaries, as witness—

"Electrical Times," *April* 4.

The existence of large flame arc lamps along the kerb detracts very much from the advertising value of a well-lighted shop window. It is an exploded notion that a blaze of light, without anything to shine upon, attracts business. It merely attracts moths and loafers. A glare along the edge of the pavement often cuts off the view of a well appointed shop window. On the other hand, nothing throws a better illumination on to a pavement than good shop lighting. . . . One of the best examples of public lighting is that of Oxford Street. Here there are brilliant arc lamps, carried at a high level down the middle of the roadway, so as not to interfere with the shop fronts. Those who observe the general scheme with care will notice that this non-interference with the warm glow from the shop fronts is an essential part of the whole effect. A less princely street could hardly afford the central line of arcs to light the traffic.

The "Electrician," *April* 12.

The average shop window is often still an eyesore, though some improvement has been brought about by reflector-shades, and by the use of concealed lamps. Many shopkeepers seem to regard the public as a swarm of moths, and thus give as dazzling a supply of light as they can afford, much to the discomfort of those who proceed to take a nearer view of the display.

The only point in these extracts with which we do not agree is the statement of the "Electrical Times" as to the brilliant arc lamps down the centre of Oxford Street; but, as "a less princely street could hardly afford the central line of arcs to light the traffic," and as "the existence of large flame arcs along a kerb detracts very much from the advertising value of a well-lighted shop window," the places that are admitted suitable for flame arcs in any scheme of public lighting are narrowed down considerably. We are obliged to our contemporary. As to the reference to reflector shades by the "Electrician," the City Corporation are not hurrying themselves in putting their bye-law into operation, which is to assure the shielding of these low-pitched high-power shop window lights on the pathway side.

The question of the metallic filament lamps is now ever with those among us who read the electrical papers. The lamps (typographically represented) are more prominent in current electrical literature than the place they have yet taken, or are likely to take, in this country under present lamp and supply conditions. Mr. W. Tatlow is the latest electrician to bring the question before his fellows; and he did this at a meeting of the Dublin Section of the Institution of Electrical Engineers. In his preliminary remarks, we are told that for many years past the attention of electrical engineers has been devoted to obtaining the greatest possible economy in generating stations, in order that electrical energy might be profitably sold "at a price which would enable it to compete with gas lighting." The scanty amount of success they have had in realizing the perfectly legitimate desire to be on level competing terms with gas, suggests that they have been labouring too much at the wrong end of the business of electricity supply, and that where the greatest amount of good might have been achieved would have been by earlier devoting consideration to the other end of the business—that end where the energy produced at the generating station is converted into light. But perhaps this concentration of attention at the generating end is not the fault of British electrical engineers. Their training was, and is, confined to the generating station; and they have never been strong in invention outside the station excepting in inventing a muddle of views as to how houses should be wired.

In his allusions to the high-efficiency metallic filament lamps, Mr. Tatlow does not add much to the common knowledge on the subject; but he finds something new to say on the effect the lamps are likely to have on the designing of a new electric lighting installation, including generating plant, storage cells, and wiring. The greater number of installations in this country have been laid out for voltage supplies of 200 or 220, and now that the new lamps have come along, or are promising to do so, it is submitted as a question whether it will not be advisable for new installations to go back to, say, 110 volts. But, even if the lower voltage be determined upon in such cases, it is not all advantage that the metallic filaments are going to bring in their train. In spite of the fact that these new lamps take less current per candle power than the corresponding carbon filament lamps, it will still be necessary to considerably increase the section of main cables, in order to have the same percentage drop as in the case of 200-volt carbon lamps. But this and the larger initial cost of lamps are the only—they are quite large enough, however—items of extra capital expenditure visible to set against the use of metallic filament lamps and low pressures to suit them. Owing to the higher efficiency of the lamps, there may be set against that higher expenditure, in the case of a private installation, the reduced cost of engines and dynamos, the reduced cost of storage batteries for equal lamp-hours, the saving of fuel, and the lamps may be credited with something for their longer useful life—at all events, Mr. Tatlow says so. He does not favour us with a hypothetical case to show how his assumptions are likely to work out in practice. But it savours somewhat of the academical to be considering future private installations, when there is the far greater problem immediately facing as to how the metallic filament lamps can best be made to serve the interests of the existing undertakings. While the station engineer cannot see the way plainly, except by such expedients as running the new lamps in pairs in series (which will not benefit the consumer, but cause him increased initial and working cost, or by introducing further complication into an already complicated system of obtaining light by introducing balancers or auto-transformers, he cannot encourage the belief—or, if he does encourage it, he cannot sustain it just yet—that the new lamps are going to yield him any great benefit. Most of the speakers in the discussion on the paper agreed, by running a number of "ifs" in series, that the metallic filament lamp would be of invaluable benefit to the electrical industry—if its life could be assured, if it were available on alternating current circuits, if it were low in price, and if it were available on 220-volt circuits. Another speaker thought that points of lighting of 25-candles and upwards would be very few in a house; so that consumers would not consider the increased illumination sufficient to

counterbalance the increased consumption necessitated by having to run lamps in pairs and in series. Therefore, at the end of Mr. Tatlow's paper and discussion, we can only say "*statu quo*."

There is a little more information wanted about a report that has just been issued, and has been made much of, as to the lighting of the Liverpool Workhouse by its own private electric light installation. Plant for the purpose has been put down at a cost of £10,000; and it is "estimated" (which is a different thing from actual figures) that a saving of £700 per annum will be effected—after making allowance for interest and repayment charges—compared with the old system of lighting. There seems to have been a mixed system of lighting in operation previously; for we read that the gas bill for the workhouse buildings and offices, and the gas and electrical energy for the officers' and nurses' home, amounted, under the old system, to £1700. Respecting the "estimated" saving, the tale may have to be revised at the end of the year, as at present there has only been the winter experience, when naturally the plant has been kept better employed than it will be during the summer months, and consequently works' costs have been, or should have been, lower than they will be in the summer time. Then, as to the old system of gas lighting, it would be of interest to know of what this consisted —whether flat-flame lighting or economical incandescent gas lighting. If it was the former, then the adoption of the latter would have resulted in great economy, and saved the £10,000 of capital expenditure. The information is altogether too meagre and vague for any reliable judgment to be formed; and it is certainly early for the jubilant talk and writing there has been in Liverpool regarding the matter during the past week. The Corporation Electricity Department have also been twitted with not being able to compete with a plant that has had to be specially laid down. One of the Liverpool papers shows that it is behind the times in respect of the present scientific methods of incandescent gas illumination, with its modest consumption of gas in bunsen burners, by stating that the new system "not only ensures a much better lighting of the whole vast establishment, but it preserves the atmosphere from gaseous impurity." If this is true, then the lighting of the workhouse must have been disgracefully done before. It is, however, a pity the public cannot be preserved from such false information, if applied to the modern system of gas lighting.

Since Mr. Robert Hammond's separation from the engineering work of the Dublin Corporation Electricity Department, the Electrical Engineer (Mr. Ruddle) has not found that his bed has been any more one of roses than it was before. The electrical is a highly technical business; but the members of the Corporation Electricity Committee pride themselves on being better judges of the requirements of their generating-station than their chief technical officer. If all can be taken as veracious that was said at the meeting of the Corporation last Monday, it would seem that, when Mr. Ruddle goes before his Committee with recommendations, the Committee promptly set him on one side, and proceed to determine the matters in their own amateur ways. If it is not the Committee, then it is the Corporation. Here is an illustration. In order to meet the requirements for next winter season, a 1500 kilowatt turbo-generating set is needed for the Pigeon House generating-station; and the Engineer's proposal was the acceptance of a tender of a well-known firm at £10,043. But there were lower tenders—one by a Company to supply at £8725. The plant is of a highly technical character; and, in the case of such a plant, we should be the last to say that the turbo-generating set supplied under the lowest tender would be the best for the purpose, or that it would be the cheapest in the end. However, a majority of laymen in the Corporation thought they knew better than Mr. Ruddle, and so his recommendation was over-ridden. The Corporation cannot now have much use for a technical adviser, seeing that there are so many men on the Corporation qualified (in their own estimation) to overthrow him. It would not by any means be presumption on Mr. Ruddle's part if he emulated some of the men on the Council by, if it were lawful, setting up in opposition as a medical man, lawyer, or in some other professional capacity. Municipal service is not all honey; and it is because the technical man is made subservient to all the whims and fancies of technically unqualified members of local governing bodies, that so much harm to efficiency is done, and so much waste of money is occasioned.

The Electrical Contractors' Association have not been disheartened by their failure last session to prevent the clauses in the London County Council Bill, enabling trading in wiring and fittings by the Metropolitan Borough Councils, passing through a municipally indulgent Parliament. The Association have this session been prosecuting with vigour an attack on a Bill promoted by the Sheffield Corporation; and it is now reported that, through the energy displayed, the opposition to the passing of the Bill in the Upper House had been so strengthened that a satisfactory settlement has been effected—the Corporation having agreed to delete entirely the objectionable clause relating to municipal trading in electrical contracting. The Association were instrumental some time since in instituting an action against the Corporation for (according to allegation) illegally trading in electrical wiring and fittings; but we have not lately heard anything about this particular piece of litigation.

At the meeting of the Institution of Civil Engineers last Tuesday, Mr. W. H. Humphreys, the Engineer of the York Water Company, was admitted as an associate member.

SEEN AT THE BUILDING TRADES EXHIBITION.

ALL works' engineers are interested in building; and at Olympia there is being held, until the 20th inst., an exhibition, under the title of the Building Trades Exhibition, which is one of the best we have seen, and which appears to take in everything from scaffolding, bricks, and drain-pipes up to highly finished fittings and decorative necessities for making perfect buildings of all kinds. There are numerous exhibits of reinforced concrete structure—such as the systems known as expanded metal, trussed concrete, and wire-lattice concrete; and there are steel bars of special sections for application in concrete-steel construction of all characters. Fire-resisting construction is demonstrated in several ways; and sheetings of various kinds are seen for rendering tanks and reservoirs water-tight. There are many exhibits in which gas engineers will be still more intimately interested.

"COALITE."

A careful examination of the numerous stands devoted to heating arrangements gives one the impression that, in the opinion of the architect and builder, the gas-stove should have no part in a display in which they are concerned. Coal stoves are shown in abundance; but it is only here and there that anything in which gas can be used for heating is detected, and then it has to be searched out. At the stand of Messrs. Ellkay and Cornes, Limited, "Coalite" is found in use in their grates. The fires throw out a good heat, and there is little flame and no smoke. Samples of the material are also on view—looking very much like a partially carbonized household coal. We are told it is going to cost "no more" than ordinary household coal. It is to be hoped not, if Coalite, Limited, are intending to cultivate a business to produce a fairly decent dividend. The partial carbonization of coal of the character used in producing these samples is not likely to yield much in the way of valuable products; but that is a matter over which we are asked to possess our souls in patience. It did not require very much questioning of the attendant at the stand to lead him to expatiate eloquently on the virtues of "Coalite;" but when asked the simple question "What is Coalite?" the attendant's warmth visibly dwindled, and the only information that could be extracted from him was that "Coalite is coal from which all the smoke-producing ingredients have been extracted." Perhaps he did not know precisely what "Coalite" is; for the words he used are almost identical with those that are found in a circular picked up at the stand, in which the informative explanation is given that "'Coalite' is smokeless coal—in other words, coal treated in such a manner that the smoke-producing elements are completely extracted from it, and its value as a fuel is increased." It is also said that "Coalite" will not produce smoke, so that the sweep will not be required; that it will ignite quickly, and give a uniform mass of incandescent fuel, with a pleasant flame; that it will radiate heat to a far greater degree than coal; that it will burn more evenly and slowly, and radiate more than double the heat of coal, and last longer; that it is a discovery of national importance; and that——well, we think enough is said to show that "Coalite" is something, or it is hoped to make the public believe it is something, very remarkable; much more remarkable in use than an ordinary coal fire, after it has burnt itself clear. Having inspected fires produced by "Coalite" under various conditions, and in different types of stoves, we should say that fires made with gas-works coke possess all the virtuous properties that are attributed to those formed of "Coalite." And it may be suggested that gas-works coke under some fancy name—say "Kokite"—would "take on" well with some people; and with a small proportion of fine coal mixed with it, and with another fancy name applied, a higher price still could be obtained for it. There is no knowing what can be done with the public until one tries. For our edification, a booklet was also appropriated from the stand, in which a large number of testimonials appear from people who obviously have had free samples sent to them. The letters are indited in most glowing style, so glowing indeed that they almost put "Coalite" to shame. It is understood though many samples have been sent round that "Coalite" will not be on the market before September; but perhaps the prospectus of the Company will be. Meanwhile, although "Coalite, Limited," will not yet say anything about the method of production, they are losing no opportunity of advertising the merits of the material. They certainly know how to advertise, even if they are reticent—though their patents are now safe—in saying anything about the system by which they partially carbonize the coal.

GAS-ENGINES.

Gas-engines are on view. Messrs. Crossley Bros. are showing one of their 39 B.H.P. engines, working on producer gas. It is known as the U.E. type, and has been specially built for electric lighting purposes. It is fitted with electric ignition, has an extra heavy fly-wheel and balancer, and the dynamo is direct-coupled to the crank by means of a flexible coupling. The suction producer plant supplying the engine is of the firm's No. 3 pattern; and the stand is lighted by the electricity produced. Also working is one of the firm's ordinary (type J) engines, running on town gas, giving 2½ B.H.P.

The National Gas-Engine Company are showing a set consisting of a 14 B.H.P. engine and suction plant. This plant is

interesting in view of the fact that it is of the same type as the one that obtained a gold medal in the Derby trials. The engine is shown running. On another stand near, there is exhibited a Hornsby-Stockport gas-engine, also running.

On the stand (in the gallery) occupied by Messrs. George Waller and Son, there is to be seen an interesting exhibit in the shape of a Pinkney gas-engine and dynamo, of a size suitable for private house lighting or the charging of electric accumulators. We understand that Messrs. Waller and Son have recently acquired the business of Messrs. Pinkney and Son; and this has brought about their interest in gas-engines. The engines are on the "Otto" principle, and embody the "Pinkney" patents, embracing unique and ingenious designs of the various details. Special pains have been devoted to render the mechanical parts as simple as possible. The governing device affords a wide range of speed, and admits only such gas as is required at that speed. There should be a field of usefulness for such an engine where small power units are required.

Hot-Water Heating by Gas.

Maughan's Patent Geyser Company have a good collection of their manufactures on view, demonstrating the perfection to which water-heating by gas-geysers has been brought—whether the water is required for direct use or for circulating to various points throughout a house. Economy with utility is combined in such apparatus when properly fitted. One good example of recent construction is the "Gacylote." It contains 15 gallons of water; and to heat this up to about 160° Fahr., gas is burned at the rate of 30 cubic feet an hour. When the temperature of the water reaches 160°, the gas supply is closed down by a thermostat control to 3 feet per hour, which is sufficient to maintain the temperature. A geyser for water circulating is shown, which will maintain the temperature of a 20-gallon supply of water, using gas at the rate of 6 cubic feet per hour. This is not quite so efficient as the first one referred to. Then there is the "Maisonette" geyser, which will supply the kitchen sink and bath-room. In the "New Teba" geyser, there is a patent valve, by the action of which the gas is automatically lighted by a pilot jet when the water is turned on and extinguished when the water is turned off. It is a very simple valve, and we are assured contains no perishable parts.

The Ruud Manufacturing Company are also exhibiting their water-heating specialities, which were fully described at the time of the Gas Exhibition at Earl's Court.

Sewer Ventilation by Gas-Lamps.

The Webb Lamp Company have in the gallery an imposing exhibit of their sewer-ventilating gas-lamps—such as we described and illustrated some time ago when one of the lamps was erected outside the General Post Office at St. Martin's-le-Grand. There are five columns shown fitted with from one to five incandescent gas-burners. One of the posts is so arranged that the visitor is able to see measured the amount of air that is drawn up the column. It is equal to 8400 cubic feet per hour with the burners alight; when the pilot light only is going, the rate at which the air or sewer gas passes up the column is about 1000 cubic feet. With the bye-pass only, there is said to be sufficient heat to destroy all that is noxious in the sewer gas; and this being so, it would be still more true when the sewer gas meets with the heat of the incandescent burner or burners.

The Petrolite Lamp.

This lamp is also on view in the gallery. As the title suggests, petrol is the fuel used in the lamp, but in a novel way, so as to rob it of all danger. The container consists of a highly absorbent stone, perforated to allow of a passage of air. The stone is placed in a container, which is filled with petrol; this being absorbed by the stone. By inserting a lighted match in an opening in the burner gallery, a slight draught is created in the chimney—sufficient to produce a suction in the inner burner tube. The cold air thus drawn into the lamp makes its way through the perforations of the stone saturated with petrol—in this way becoming carburetted. Passing up the tube, the carburetted air meets with a secondary supply of air, resulting, on being ignited, in a bunsen flame which, with an incandescent mantle, gives a very good light.

Miscellaneous—Tar for Road Purposes.

There are exhibits of portable railways, with waggons and tips (of a kind that should find good employment in gas-works) shown on the stand of Mr. Arthur Koppel. Messrs. John Barker exhibit the Kennedy tube and bar bending machine, which has been improved by the addition of a ratchet with gear, for the purpose of increasing its bending power. The Phœnix Engineering Company, of Chard, are showing portable tar, pitch, and asphalt boilers, in capacities varying from 10 to 500 gallons; a portable tar carrier, dipping pan, and pails; and contractors' pumps for trench work. The "Tarmac" Company exhibit ironstone slag before and after impregnation with the oils of tars; and they also expose for inspection sections cut from roads in the Midlands constructed under their system, after the roads have been subject to regular traffic for some years. The "Tarspra" Company, whose system is specially noticed elsewhere, have a stand at which information can be obtained as to the mechanical spraying of tar under pressure on road surfaces for preserving them, and completely curing the dust nuisance under modern conditions of high-speed traffic.

SUBSIDENCE RESERVOIRS AT WALTON.

Opening by the Metropolitan Water Board.

Amid a return of perfect spring-like weather conditions which rendered the function in every way an enjoyable one, a party of considerably over a hundred, consisting of members of the Metropolitan Water Board and their guests, visited the neighbourhood of Walton-on-Thames last Saturday, for the purpose of witnessing the opening, by Sir R. Melvill Beachcroft, the Chairman of the Board, of the two subsidence reservoirs which have been under construction for the past six years. Travelling by special train from Waterloo to Hampton Court, the company boarded a steam launch in waiting just above Molesey Lock. This conveyed them to the intake of the reservoirs; and there they disembarked, and proceeded by the works railway a few hundred yards inland to the site of the reservoirs.

These have been named respectively the "Bessborough" and the "Knight"—after Lord Bessborough and Sir Henry Knight, two members of the Board of the late Southwark and Vauxhall Water Company, by whom the construction of the reservoirs was commenced as far back as 1901. On the "Appointed day," not quite three years ago, of course the work was taken over by the Metropolitan Water Board, who have now carried it to a successful issue—with the aid of Mr. J. W. Restler, who, as Engineer for the Water Company, was responsible also for the origin of the scheme. Viewed from the top of the embankment, the reservoirs make an imposing picture—as will be easily imagined, when it is mentioned that the "Knight" covers an area of 51½ acres, and the "Bessborough" no less than 74 acres; the capacities being 480 million and 718 million gallons. The main object of their construction was, by efficient subsidence, to improve the quality of the water before passing it to the filter-beds. The site of the reservoirs has for very many years been known as Apps Court; and the Act which authorized their construction also permitted the Company to take from the Thames an additional average quantity of 20½ million gallons a day, with a maximum of 100 million gallons in any one day—subject to a minimum rate of flow being maintained at Penton Hook.

Messrs. John Aird and Sons (who were represented at the opening ceremony by Mr. Malcolm Aird, Mr. Basil P. Ellis, and Mr. R. Smith) were the Contractors for the work, which involved no less than 1,500,000 cubic yards of general excavation, 1,429,000 cubic yards for forming embankments, 200,000 cubic yards of puddle, and 75,000 cubic yards of portland cement concrete. The lining of the reservoirs contains 13,000 superficial yards of brick paving, and 13,000 lineal feet of coping—equal to nearly 2½ miles. The cost of the work was approximately £419,000. The intake was also constructed under contract by Messrs. John Aird and Sons, and consists of three tunnels, each 12 feet by 8 ft. 6 in., commanded by "Stoney" sluices made by Messrs. Ransome and Rapier, with screen chambers, &c. Connecting these works with the reservoirs and filters at Hampton, are two lines of main, each 48 inches in diameter, which have been laid to a point on the southern bank of the River Thames whence they descend, by means of a cast-iron shaft, to a tunnel under the river, through which the mains pass to the northern side, where they are to be connected with the large reservoirs at Staines. The machinery to be erected for the reservoirs will be capable of pumping from the river 100 million gallons in 24 hours; and the completion of the work will place the Board in possession of sixty subsiding and storage reservoirs for unfiltered water, having a total area of 1435 acres, and a capacity of 8884 million gallons—or sufficient to supply about 40 days' average consumption for a population of 6,750,000. As indicating the magnitude of the Board's business, it may be pointed out that the average daily supply of water in 1905-6 was 218 million gallons—123 millions from the Thames, 44 millions from the Lea, and 51 millions from springs and wells. The length of mains in their area last February was 6096 miles; while the income on revenue account in 1905-6 was £2,778,185, and the expenditure £2,757,770.

On arrival at the reservoirs, the party proceeded to a marquee, where the opening ceremony was performed.

Mr. E. B. Barnard, M.P., remarked that the accident of his being Chairman of the Works and Stores Committee of the Metropolitan Water Board placed him in the proud position of presiding over this interesting ceremony. The two great reservoirs which were about to be declared open were additional safeguards and improvements to the water supply of this enormous city. He would not take up time by laying stress upon the general object-lessons of the reservoir question and the water question, and their teachings; but perhaps he might be just allowed to remind those present that for years a controversy raged as to whether they in London should go farther afield or whether they should utilize the home water supplies. Equally, the arguments as to whether the supply should be in the hands of companies or whether it should be under municipal management were continually in the public purview. All these things had now been got rid of; and they started from a new position. It was an Act of Parliament which created the Metropolitan Water Board; and they, as a Board, became the inheritors—they were practically speaking the trustees—of the water supply. They had handed over to them all the responsibilities of the eight Water Companies; and although they in no way whatever were responsible for the creation of the Act, they were called upon to administer it as they found it. And he ventured to submit, without any presumption, that they had, in a modest and simple way, done their duty. He did think that it was not altogether out of place for him to claim that it was a great result to have had transferred to them

within the short space of three years these enormous business undertakings, and to be able to say that the transfer had been effected without any catastrophe, and the business carried on without any break, and that no harm had accrued in any shape or form to the health of this, the greatest city in the world. He had only to remind them again that the question of municipal control had ceased. They were a municipal body—they were the greatest body of this description in the world; and their task was a gigantic one, as would be realized from the number of their customers and the quantity of water required. There were just one or two other points he hoped they would forgive him for mentioning. They had acquired the water undertakings at a huge money cost; and yet they were in the proud position of not having charged the rates one penny. On the top of this, they had improved the labour conditions. They had increased the wages bill, and reduced the hours that they were calling upon many of the men to work. This indicated that they had been alive to their responsibilities, and had tried to act up to the position they were called upon to occupy. If the population continued to increase, they themselves could not keep still; and whereas each of the eight old Companies had their own particular problem to solve, the Board were confronted with the whole eight combined in one. Though theoretically this might seem easier, it really involved a responsibility which, even with the advantage they had of their expert advisers, was very onerous; and it was difficult to know how to move for the best. The question of whether they should go to Wales or continue to look to their home supplies had been largely solved by the construction of the reservoirs which Parliament had authorized at Staines, and those which they were to open that day. Perhaps, therefore, he might just refer to the particular Company whose work they were now looking at. The Southwark and Vauxhall Water Company were a fair sample of the rest; and he said, without fear of contradiction, that, though there might have been differences of opinion in the past, the Companies were alive to their public responsibilities. He ventured to express the view that, though they were commercial concerns, they were fully alive to what was demanded of them; and the Southwark and Vauxhall Company, he found, were always in front of their requirements. In times of drought, they were able to transfer water to other Companies. When he saw these reservoirs, he was reminded that they were a standing example of what a water authority should do. It was not the necessity for additional water that led them to plan these reservoirs, but the desire to improve the quality. The subsidence reservoirs of which there were so many in the possession of the Water Board had been the main safeguard of the health of London; and the more of them they had, the more certain would they be of giving a regular quality to the water-drinking people. When there was a drought, or when the water in the Thames was unsuitable, they would, by means of these reservoirs, be able to regulate and control its distribution. Now a word as to the Directors of the Company. It was on his proposition that they asked Lord Bessborough and Sir Henry Knight to allow their names to be connected with these two reservoirs. It appeared to him only suitable and right that those who were the originators of, and the responsible persons for, this work should have their names allied to it for all time. He was also very glad they had with them the Engineer of the late Company, Mr. J. W. Restler. It needed no words of his to refer to his professional reputation. He was a distinguished Engineer; and these reservoirs were but one of many works with which he had been successfully connected. He mentioned Mr. Restler, because he wished to lay stress on this—that the good results of their working as a Board had only been rendered possible by the loyalty with which the senior officers of the Companies accepted the new state of things, and by the sympathetic way in which they brushed aside the different matters to which they had been accustomed in the past, and fell in with the Board's methods of working. This had enabled them to get along pleasantly. Mr. Restler was a very good example of a man who, when he wore a uniform, invariably followed the band that went in front of it. It appeared only suitable that Sir R. Melvill Beachcroft should perform this opening ceremony. During the period that he had been Chairman of the Board, and, in fact, the whole time he had been before the public world of London, he had ungrudgingly, and unselfishly, and unsparingly given himself up to his idea of what the public service demanded; and his fidelity to the work of the Board would always be remembered by everybody. He had the greatest pleasure in calling on Sir Melvill to perform the opening ceremony.

Sir R. MELVILL BEACHCROFT, Chairman of the Board, said he was exceedingly grateful to his colleagues on the Board, and in particular to the Chairman of the Works Committee, for affording him the privilege of turning on the water—mainly, perhaps, because he was pleased at the opportunity it furnished him to pay a compliment to the late Southwark and Vauxhall Water Company, who, with much foresight, initiated this great undertaking. Not so long since, it was his misfortune, as Chairman of the Arbitration Committee, to find it his duty to say a good many unkind and hard things about this Company, as well as the other Companies. But *tempora mutantur*. He had now learnt wisdom, and he could appreciate the great work of the Southwark and Vauxhall and also of the other Companies. He believed the custom of their predecessors had always been, when they opened or completed a work connected with the water supply, to have something in the nature of a ceremony. In this the Southwark and Vauxhall Company followed the example of their early predecessors, the London Bridge Water-Works Company, who, in the reign of Queen Elizabeth, opened the first water-works in connection with two of the arches over the Thames; and on that occasion, the Lord Mayor and Aldermen all attended in great state to see the water squirted over the steeple of St. Magnus Church. Later on, when Sir Hugh Myddelton completed his great scheme, people with drums and banners assembled round the pond in Clerkenwell to do honour to the man who had carried out the work. On the present occasion there were no banners or drums; but nevertheless they regarded the ceremony as a very important one. Mr. Barnard had said something highly interesting on the subject of storage and its object. Well, he (the speaker) would like in a few words just to emphasize what had been stated. Of course, primarily they assumed that storage was meant to guard the consumer against dry seasons, when there was no water for his wants. But there was, they now knew, a greater object, and this had reference to its effect on the quality of the water. He had lately asked their eminent Director of Water Examinations, Dr. Houston, if he could in a few words give his views on the latter point. He replied that the chief importance of storage was to be found in the fact that the micro-organisms of water-borne disease gradually died when they had to contend against the ordinary water bacteria in a struggle for existence. All available evidence pointed, not only to the practical inability of pathogenic bacteria to multiply in water, but also to the fact that their loss of vitality was merely a question of time. If water was stored for weeks or months, the probability of any hurtful bacteria surviving became very remote. Water stored sufficiently long, even if turbid, was, in the light of present knowledge, incapable of giving rise to epidemic disease. Dr. Thorpe, of the Local Government Board, had also stated that the line of defence of storage was as strong as that of filtration. Now, the aim of the Water Board was to have sufficient storage to render it practicable for every gallon of water to go through a sedimentary stage before it passed to the filter-beds; and they were convinced that if this were done the security of the London water drinker would be practically assured. It was interesting to know that the water they saw around them represented about one-eighth of the total storage of the Water Board, which was something like 8880 million gallons. They were building within a mile of the spot another reservoir practically as large as these two together; and in the Lea Valley they were about commencing a reservoir capable of holding very nearly three times as much as those they were now opening. When these two works were completed, they would have practically 12,000 million gallons of storage—about the identical capacity of the great lake in Wales which supplied the wants of Liverpool. No doubt, they would have to go on with these works as the population increased. The reservoirs they saw there had taken six years to complete; and if the number of consumers continued to grow, they would have to go on building reservoirs every few years. The task was, as had been remarked, a gigantic one. They were proud to finish the work initiated by the Southwark and Vauxhall Company with the aid of Mr. Restler, and completed by the Board with the aid of Mr. Restler—a friend, and indeed a friend, of both bodies. They, like the Company, desired to express their obligations to Mr. Restler for his exceeding cleverness in designing this and other works. The reservoirs were to be named after two gentlemen connected with the Company—both public men who were well known to them. Both were Directors of the Company, and both, he believed, had served in a municipal capacity. He had great pleasure in christening these reservoirs the "Bessborough" and the "Knight;" and in declaring them open for the use of the consumers of London, he would express the hope that God would bless the efforts of the Water Board, and particularly the efforts of the important Works Committee, over which Mr. Barnard presided in an admirable manner, and enable them to supply wholesome water to the teeming population of London.

[Sir Melvill Beachcroft then opened the valve, and water commenced to flow from the reservoirs.]

Mr. V. B. TRITON, who was formerly a member of the Board of the Southwark and Vauxhall Company, on being called upon, said he regretted the absence of Sir Henry Knight (who was in Australia) and Lord Bessborough. He could only express his deep thanks for the kind things that had been said that afternoon. The Company conscientiously and earnestly tried to do their best for the interests of the public as well as for the shareholders, and to look forward as much as possible. This was shown by the works they were there to see opened. The Company were aided by Mr. Restler; and he (the speaker) was proud to see the magnificent scheme finished.

Mr. JOHN GLASS, Vice-Chairman of the Water Board, remarked that before they inspected the works, he would like to propose a vote of thanks to the Chairman of the Works Committee, Mr. Barnard, not only for his speech, but for his general interest in the question, and love of the work which they, as members of the Water Board, had to perform.

Mr. J. LIDIARD, a member of the Board, seconded; remarking that the time and labour devoted by Mr. Barnard to the service of the Board was beyond anything they could have thought of.

Mr. BARNARD, in acknowledging the vote, said he was glad his position had given him the chance of taking a share in this important work.

Tea was then served in the valve-house and the marquee, after which the party re-embarked on the launch and were taken to Hampton, where the Riverdale Works of the Southern District (late Southwark and Vauxhall Company) were inspected. They were then conveyed back to Waterloo by special train from Hampton Station.

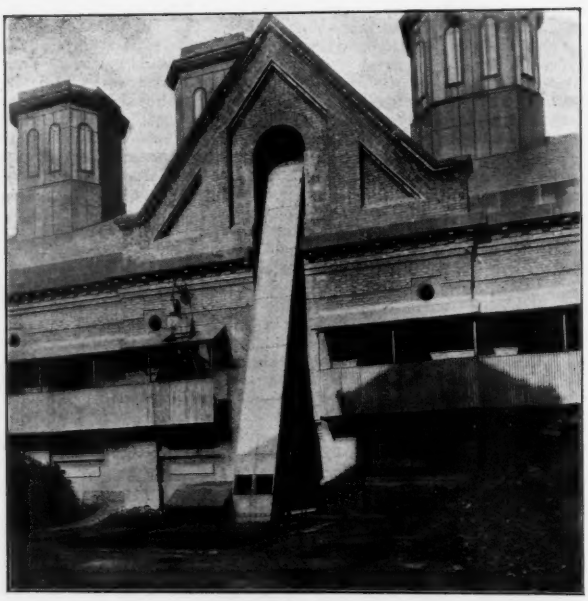
A Gold Medal for the Oriental Gas Company.

The Indian Industrial and Agricultural Exhibition which was held at the beginning of this year in Calcutta, was lighted by gas and electricity; and Kitson, acetylene, and oil lamps were also shown. The importance of the exhibition will be marked by mentioning that it covered no less than 22 acres of ground; and the scheme for the portion of the lighting of this vast display that was undertaken by the Oriental Gas Company incorporated both high-power (including Lucas lamps) and ordinary incandescent gas-burners. We are pleased to hear that the Company scored in this exhibition a success as they did at Lady Minto's exhibition, their achievements at which were recently noticed and illustrated. One result of what they did at the Industrial and Agricultural Exhibition, is that they have been awarded a gold medal for having supplied the cheapest light there. Honours, in the shape of gold medals, are not often awarded to gas companies, though not because they do not deserve them; and consequently the Company will be proud of their new possession. We congratulate them upon it.

INCLINED RETORT-HOUSE EQUIPMENT AT STOCKPORT.

Second Article.—The Coal and Coke Handling Plant.

THE position to which the first article brought us in describing the new inclined retort installation at the Stockport Corporation Gas-Works leaves us free to devote this second article entirely to the coal and coke handling plant which has been adopted, and which gives to the scheme a completeness as finished as it is possible to make it (in view of the subjection of the general plan and design to existing internal and external conditions), from the handling of the incoming coal to the final disposal of the coke. The system of handling the material—particularly coke—interests;

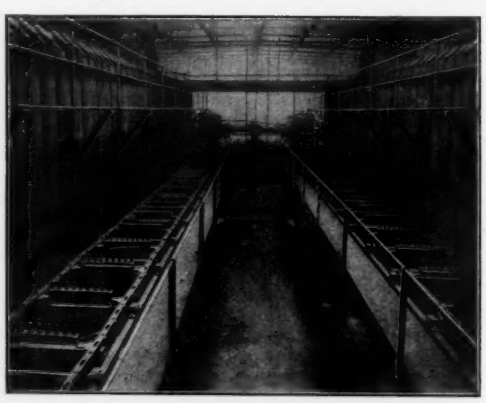


Coal-Receiving Hopper and Twin Elevator.

and it embraces several novel features, to produce compliance with circumstances and requirements, in which we trace the conceptive mind of Mr. Meunier, and the seconding efforts of Messrs. Robert Dempster and Sons, Limited, of Elland, who were the contractors for the entire coal and coke plant. Among the points associated with the coke plant which will to-day be more specially noticed are the means provided for dealing with the material in various ways outside the house.

THE COAL PLANT—FROM ELEVATOR TO HOPPER.

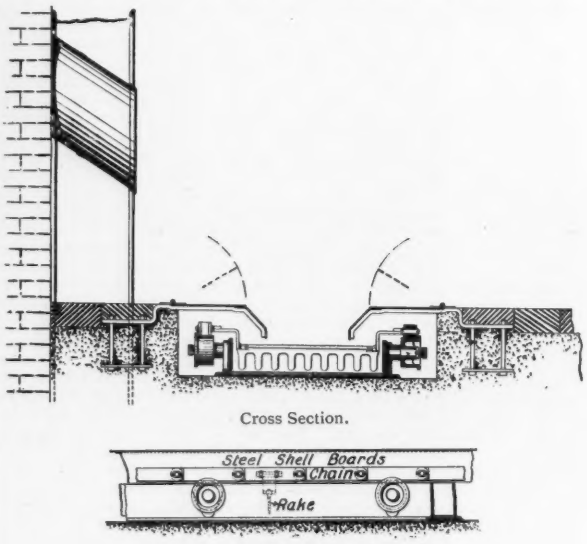
There is so much to be said about the plant that it will be wise to deal with it in its natural sequence; and, therefore, we will commence at the yard-level with the coal-handling plant. The coal is delivered to the works by carts, and that required for the new inclined retort installation will be deposited in a hopper that has been sunk outside the house. From this hopper, the course of the coal is this: It is first discharged, in a steady and even flow, by means of an adjustable reciprocating feed of the tray type, on to a bar screen. The large coal or cannel goes into the breaker, and the small direct to the elevator; or, if it is desired, when only small coal is brought in, the breaker can be bye-passed, and the coal delivered direct from the hopper to the elevator boot. The tray feed, which has been fitted with a fast-and-loose belt drive and



The Retort-House from Above—Looking on to the Drawing-Floor and Showing the Returns of the Hot-Coke Conveyor.

actuating gear, is carried to a convenient height above ground, so that the coal-feed can be at once stopped; thus allowing the breaker, elevator, &c., to entirely clear themselves, and not have to start with a load on. It was ascertained that the total depth of the breaker and elevator pit is 17 ft. 6 in.; and it was observed that the pit is covered with steel chequered plates.

Turning to the elevator, it is of the twin steel-cased type, each elevator or run of buckets being of 30 tons capacity per hour. It is 61 feet from the centre of the shaft in the elevator-boot to the centre of the shaft at the elevator-head. The buckets are of cast malleable iron, with steel skidder bars riveted to them for running on renewable flats attached to the angles of the elevator casing. The chains are of the bushed type, suitable for a working strain of 4000 lbs. This is greatly in excess of what such chains are required to work at; so that a large margin of safety for wear and tear has been allowed. It was noticed that the twin elevator has been placed in the centre space between the two retort-benches; the reason being that there existed in this position a convenient dormer roof, which only required a slight modification of the trussing of the dormer principals. From the elevator, the coal is delivered, by a compound delivery shoot, direct on to a longitudinal push-plate conveyor, to fill the continuous hoppers over the retort-benches on the near or elevator side, or, as desired, on to a cross push-plate conveyor, which delivers the coal into the longitudinal conveyor feeding the two retort-benches on the far side from the elevators. The overhead hoppers are roomy, being 7 feet wide and 5 ft. 10 in. deep to the bottom of the cone. Each hopper is continuous over a bench, and is capable of carrying 14 tons of coal. The effort has been, Mr. Meunier tells us, to get as near as possible a twenty-four hours' supply of coal over each bed. Both longitudinal conveyors, it is remarked,



Cross Section.

Elevation.

The Hot-Coke Conveyor.

have had to be made reversible, owing to the elevators being central in the house; and the slight headroom in the existing roofs has also necessitated the return of the conveyors being carried on the underside of the charging-floors. The coal-conveyors are of the double chain push-plate type, with troughs 18 inches wide, formed of channel steel sides and steel bottom plates. The push-plates are fitted with malleable backs and renewable skidder bars; the ends of these bars passing through the solid links of the chain to which they are riveted—thus making a very strong job. Towards the end of the first article, mention was made of the fact that Mr. Meunier was addicted to the provision of as much convenience as possible for obtaining access to his moving plant; his opinion and experience being that convenience for doing work and its actual and constant performance have a very close relationship. All three conveyors have been fitted with suitable steel plate platforms, hand-railing, and staircases, in order to give ready access from the charging and drawing floor levels—the cross conveyor having platforms at both sides, and the longitudinal conveyors on one side only. There will be therefore no excuse for inattention.

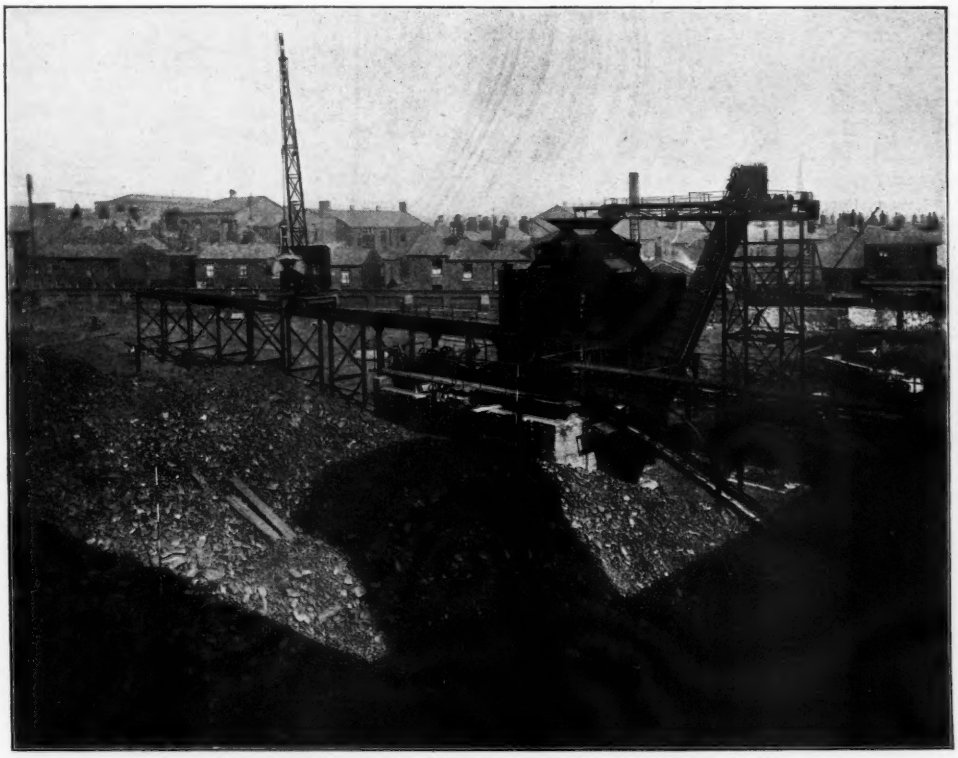
We have here another instance of electricity being, in the particular circumstances, specially applicable for the driving of gas-works plant. The Corporation electricity generating station adjoins the works; and the division of the points of operation in the plant makes specially suitable the adoption of electric-driven motors. Therefore, we find that Mr. Meunier has installed for the driving of the complete coal plant four 12 B.H.P. electric motors. There is one on the ground level for driving the coal and cannel breaker; the first reduction from the motor being by

means of raw hide spur-pinion gearing with a cut cast-iron spur-wheel, and then by belt to the breaker countershaft. The whole of the spur gearing is of cast steel. The drive to the twin elevator and cross conveyor consists of one motor, with a first reduction as already described, and thence by spur gearing and chain drives to the sprocket wheel shafts of the elevators and cross conveyor. The drives to the longitudinal conveyors over the coal-hoppers are similar to that for the elevators, &c.; but the motors are of the reversible type to suit the conveyors. All the starters are of the slow screw type, with quick overload release, and are all placed near their respective motors; the main cut-out switches to each being in the carbonizing foreman's room. It may be at once stated, on this first mention of the electricity plant, that the whole of the motors, switches, and so forth, for the coal and coke plants, as well as the motors on the crane (which is a feature to be described later) were supplied by the Lancashire Dynamo Company, of Manchester—the motors all being of one size except for those on the crane.

The Coke Plant and Appliances for Distribution.

Now we come to the coke plant; and about its outer portion there is an interchangeability of use and service that is bound to claim the consideration of engineers who are pressed for coke space, who require to supplant night by day work on coke as much as possible, and whose necessities demand a good range of means of deposition and disposition. To say the least, we have here a very fine plant of a capacity of from 15 to 20 tons an hour.

The first part of the plant to receive notice were the two lines of longitudinal hot-coke conveyors—placed one in front of each pair of retort-benches. It required little examination to observe that they are of Messrs. Robert Dempster and Sons' patent type, with the chains and working parts outside the trough, and away from the grit and water. It must be some three-and-a-half years ago since we saw a smaller example of this design at the Shrewsbury Gas-Works; and it is believed its operation there since has given every satisfaction. The lengths of the new conveyors with which we are now dealing are 150 feet and 166 feet respectively. The troughs are formed of two 7 in. by 3 in. by $\frac{1}{2}$ in. steel angles, riveted to a $\frac{1}{4}$-inch steel bottom plate. Inside the bottom of the troughs are cast-iron renewable plates, held in position by means of renewable steel plates 6 in. deep by $\frac{3}{8}$ in. thick, bolted to the inside of the trough angles—thus also preserving the actual trough sides from wear by the coke. At 3-feet pitch on the outside of the troughs are cast-iron flanged rollers, mounted on hard steel trunnions fitted with lubricators, and riveted in cast-iron brackets, which are bolted to the side angles forming the troughs. The chains (being parallel without projections) run over, and are carried and guided by these rollers. The links are of cast steel, 12-inch pitch, with Jackmanized steel pins, which have a deep and very hard skin or case hardening. The pins of the links are held in position by $\frac{1}{4}$-inch steel split pins, fitting in shallow milled grooves in the bosses formed on the links. At every 3-feet pitch on the chain, attachment links are arranged, to which the cast-steel rakes or scrapers are riveted. The idea of the rakes in



General View of the Coke-Plant in the Yard from the Charging-Stage.

preference to blind scrapers or rods, we were informed, is that there is less tendency for coke to get nipped between the bottom of the trough and scrapers or rakes. The carrying troughs of the hot-coke conveyors are placed in concrete trenches on the drawing-stage, and each is arranged with steel plate shell boards and chequered steel plate hinged covers over the chains, rollers, &c., for the whole length of the retort-house. The shell boards and chequered plate covers are carried from bent 4 in. by $\frac{3}{4}$ in. flats bolted into the concrete floor. The whole floor is paved with blue bricks right up to, and partly under, the chequer plate covers as shown by the drawing. This illustration, by the way, also presents the general details of the coke-conveyors. The whole of the return chains and rakes are carried back overhead on flanged rollers mounted on steel spindles, working in cast-iron ring lubricated bearings bolted on running angles, which are carried from the front buckstays by angle steel brackets, which also support a continuous overhead platform for lubricating and inspecting purposes. The whole of the sprocket wheels for the coke-conveyors are of cast steel, mounted on 4-inch diameter shafts working in bearings of large area. The chain tightening gears are of the weighted automatic type; thus keeping at all times a stated and equal tension on the chains. Regarding the driving gears for these conveyors, each consists of a 12 B.H.P. electric motor (as described for the coal plant) with a first reduction by a raw hide pinion and cut cast-iron spur wheel, and then by steel and cast-iron spur gear to the sprocket wheel shafts. An extra feature that has been embodied in this driving gear is a pair of Toogood's patent equalizing wheels, designed to overcome the irregularities of jerky driving, which is commonly found when working with long link chains.

Passing on, the two hot-coke conveyors which we have been describing will deliver the coke on to a cross conveyor placed below the floor at the end of the retort-benches; the length being 133 feet, measured on the horizontal. This conveyor, on leaving the retort-house, runs under the roadway; and then rises at an angle to a height of 14 ft. 6 in. for delivering into an elevator or the coke-pits to be described later. This conveyor is of exactly the same make as the two hot-coke conveyors, but with the addition of rollers to hold the chains, &c., down at the point where the conveyor starts to rise. At this point, too, the sides of the trough are perforated, to allow any surplus water from the quenching to be disposed of; the water being first run into a sump, to let any breeze settle before allowing the waste water to go to the drain. The end of the cross conveyor delivers into coke-bunkers, which are built of concrete and brickwork, partly above and partly below the ground or yard level, with fronts of steel plate. The size of the bunkers is 14 feet high by 12 feet wide by 30 feet long, with a holding capacity of 60 tons. The principal idea Mr. Meunier had in putting in these bunkers was to curtail to a minimum attention to the coke plant outside the retort-house during the night. The bunkers are therefore intended to receive the whole of the night draw; and this is to be discharged during the daytime by an overhead crane, to which we shall be referring presently. In passing, it is interesting to

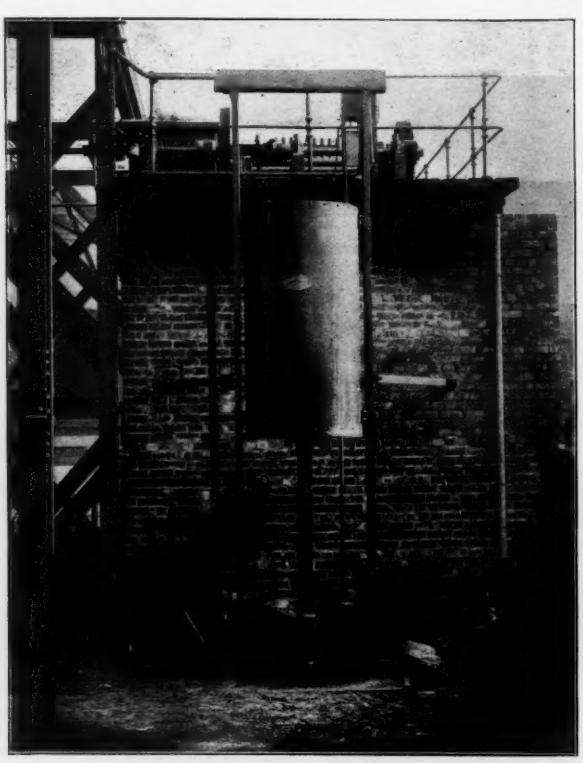
Coke Elevator, Hoppers, Screens, Crane, and Gantry.

Cross Coke Conveyor and Delivery to Tray-Bucket Elevator.

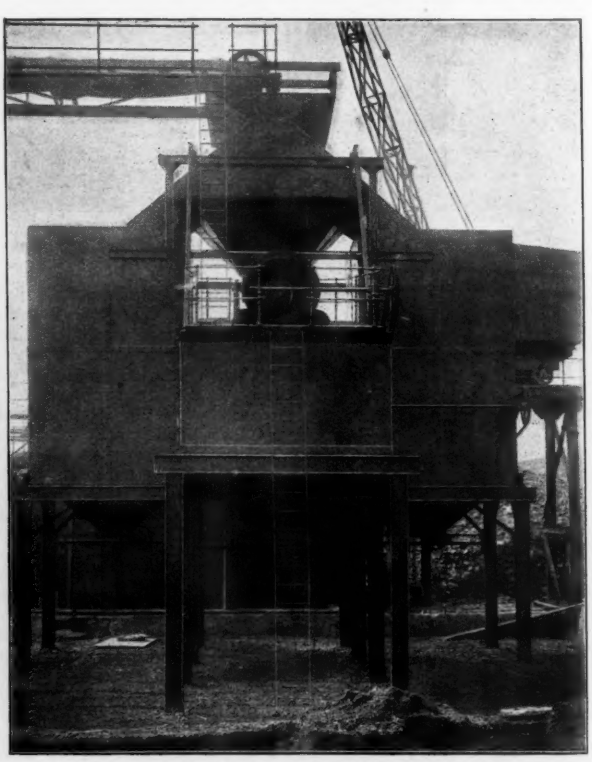
notice that, in the steel-plate front of the bunkers, are three slide-doors, each provided with a hydraulic ram. These rams receive their power from a set of pumps and accumulator which are placed near the bunkers. The valves for the rams are carried to a convenient point, so that the slides can be operated by the crane man without him having to leave the gantry. The outlets are arranged to deliver into a 1 ton capacity automatic dumping skip, attached to the overhead crane, which will lower it into the trench provided in front of the bunkers.

This brings us to another component part of the scheme to which there has just been allusion—the crane. This, which is electrically driven, is carried on an overhead gantry, 150 feet in length, formed of rolled steel joist and channel of very strong design. The crane, when discharging from the bunkers, has been arranged so that it can deliver the coke to the fixed screens (hereafter described) by only hoisting and slewing a quarter of a circle; and we understand that there is no necessity to travel the crane at all, unless the coke being discharged from the bunkers is required to be put into stock in the coke-yard. The crane, which is made for a working radius up to 20 feet, can thus, in conjunction with the long length of gantry, make a large stack of coke without having to resort to hand labour. And this does not exhaust the value of the crane. It is also fitted with a grab (of 7 cwt. capacity), and by this means can, if required, discharge from the coke stack to carts or to the fixed screens.

The coke screens and hoppers (to which several incidental references have already been made) are fixed at a point near the bunkers feeding the crane skip. They consist of two hoppers for the



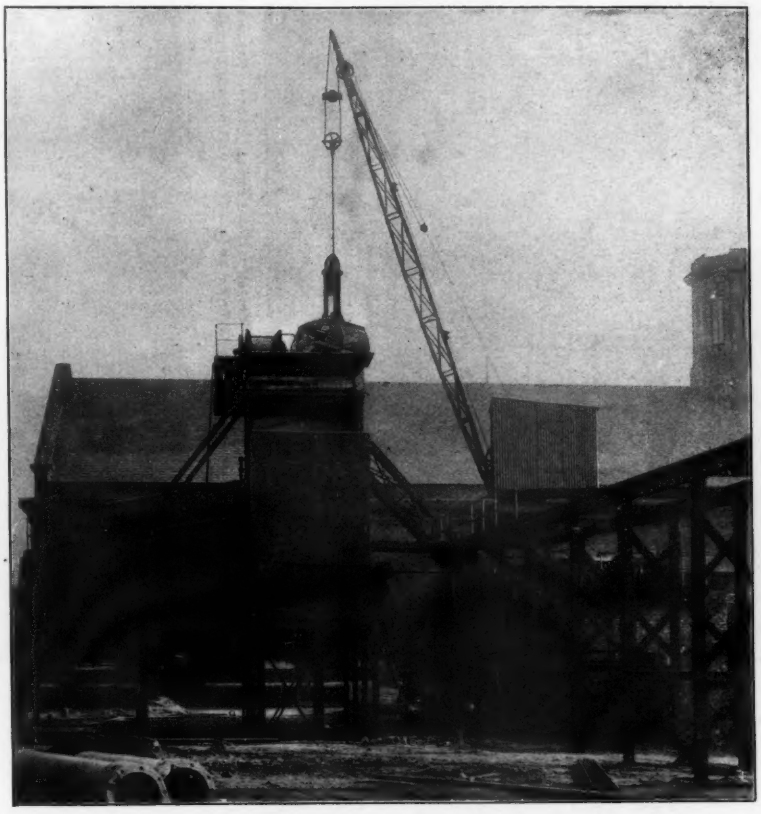
Hydraulic Pumps and Accumulator for Working the Outlet Doors from the Coke Pits to the Crane-Skip.



End View of the Coke Hoppers and Screens; also the Band Conveyor from the Tray Elevator.

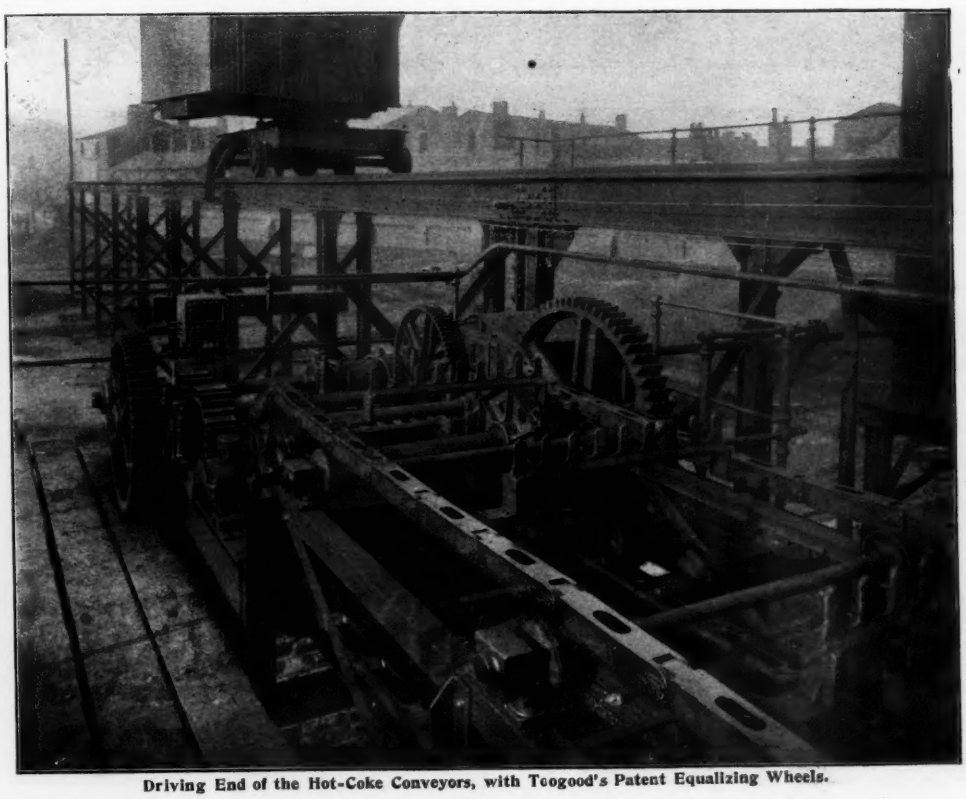
large screened coke, with a total capacity of 40 tons; one hopper or compartment for breeze, with a capacity of 12 tons; and also a hopper for medium size screened coke, of 10 tons capacity. All the hoppers are fitted with rack-and-pinion operated doors for filling carts. The screening arrangements consist of two fixed bar screens, with a feeding-hopper over them for receiving the coke from the crane skip or grab, as well as from the coke elevator. These screens (which are 9 ft. 11½ in. wide and 6 ft. long, and with 2½-inch clear space between each bar) are only intended for separating the rough small coke from the large which is delivered direct into the hoppers. The rough small goes into a revolving screen, and, after separation, is delivered into the breeze and small coke-hoppers. The revolving screen (which only separates out the breeze and the material that will pass through the 1½-inch holes) is formed of perforated steel plates, with cast-iron rail rings on the outside, and running on, and supported by, double-flanged cast-steel rollers, carried off the framing at the top of the hoppers. The revolving screen, which is driven off the same shafting as that which drives the cross coke-conveyor, is arranged with clutch gear, so that it can run independently of the cross conveyor, or *vice versâ*.

The coke-elevator, &c., which has been referred to, is arranged to receive the coke through a slide door in the cross conveyor at a point before it reaches the bunkers or the pits, with the object of taking the coke automatically direct from the retort-house to the screens and overhead hoppers when it is not desired to dispose of it into the coke bins at the end of the conveyor. The elevator, which is of the continuous tray bucket type, is at an angle of about 45°, with a total vertical height of 41 feet, and receives the coke through the slide on the cross conveyor down a short shoot direct on to the up-run of the buckets, without any necessity for a boot—thus avoiding unnecessary breakage of the coke, and wear and tear to the elevator. From this elevator to the before-mentioned hopper on the fixed screens, the coke is conveyed by a rubber and canvas belt conveyor, both being driven by one electric motor, with a first reduction as described for the other elevators and conveyors, and thence by cast-iron and steel bevel-and-spur gear.



Side View of the Coke Hoppers and Part of the Crane Gantry, &c.

We have been considerably interested in this Stockport inclined retort installation and its auxiliary plant. It is a good instance of the adaptation of modern methods to old circumstances, and of the realizing through the new means of the maximum result from the ground space available. Ingenuity is only another name for engineering; and a good deal of ingenuity is found in the work that has been done here. Upon it, first and foremost, Mr. Meunier (upon whom rested the responsibility for the planning and designing) must be congratulated; and secondly the contractors. The work displays a finished interpretation of the Engineer's desires both in the portion (the retort-benches) in which Messrs. Gibbons Bros., Limited, were concerned, and in that (the coal and coke handling plant) which was confided to Messrs. Robert Dempster and Sons, Limited.



Driving End of the Hot-Coke Conveyors, with Teogood's Patent Equalizing Wheels.

THE GAS-WORKS AT MENTONE.

Two of the Mentone Gas-Works Buildings—One containing the Engine-Room, Scrubbers, and Meter; the Other, the Sulphate Plant.

Purifier-House and Coke-Store.

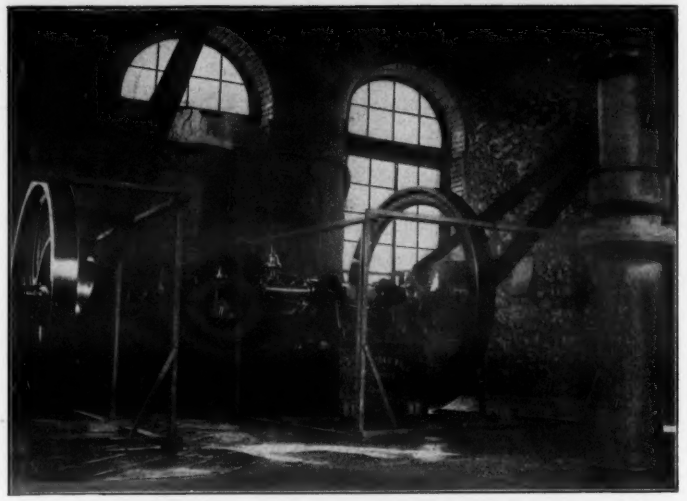
Most readers of the "Journal" are aware that with each recurring winter there is a brisk exodus of the leisured and wealthy classes of the country to the South of France. As what is known as the "season" there is now drawing to a close, it may be of interest to give a few particulars of the gas-works at Mentone.

The gas-works are situated at the extreme west end of the town, at a point not far distant from Cap Martin—a small and very lovely promontory dividing Monte Carlo from Mentone. They are small, but well arranged. The bench of six settings, each containing six single retorts, is built on the regenerative system, and the heats are uniformly good. There are no special facilities for receiving coal, which is carted into the works, and stored under cover, and barrowed into the retort-house. The retorts are charged by hand; and the coke is drawn out by rakes into special tipping coke barrows, the bodies of which are so constructed as to turn completely over on being operated by means of a chain. The arrangement is very neat, and is far preferable to the ordinary coke-barrow. The coke after being quenched is loaded by forks into large two-handled baskets, which take the place of sacks. They have several advantages, inasmuch as they are easily filled (not having to be held open), and are equally easily lifted by two men into coke carts. The use of these baskets conveys the impression that coke would be more cheaply loaded into carts by this method than when sacks are used.

In the engine-room are two Crossley gas-engines of 13 H.P. and 7 H.P. respectively. The larger engine works a shaft from which the exhauster is driven; being fitted with a bye-pass arrangement in which a valve is operated by a chain attached to the bell of a governor connected to the inlet gas-main. No man is left in charge of the gas-engine, which is set to run at a uniform speed; all irregularity in the make of gas being adjusted by the governor, which opens or closes (by means of the chain) the valve on the bye-pass pipe, allowing more or less gas to flow back into the inlet-main. This well-known, but economically unsound, system of governing is undoubtedly the best method to adopt where a gas-engine is used, and where a man cannot be spared to look after it. In any case, the system is giving complete satisfaction, and might be more extensively adopted in England, possessing as it does the very substantial and obvious advantage of making the gas-works themselves a remunerative consumer; and, besides, in small works a boiler is unnecessary—another factor which is all in favour of the adoption of a gas-driven exhauster. In addition to the exhauster, two small liquor pumps, and a "Standard" washer-scrubber are driven off the same shaft, as is also a small coke-breaker and screen.

The tower scrubber, which is of the ordinary type, filled with coke, and the washer-scrubber, are arranged under cover in a building which also contains the meter. In another building is a very compact and up-to-date sulphate plant. The two gasholders and the purifiers, erected by Messrs. C. & W. Walker, are of modern design, as also are the condensers, which are of the water-cooled type. The buildings, which are tastefully designed, are built of stone, and roofed with red tiles; the effect being very pleasing and quite in keeping with the picturesque surrounding scenery. The price of gas is 25 c. per cubic metre, equivalent to 5s. 10d. per 1000 cubic feet. Coke is equally high in price, and fetches about 50 frs. per ton.

Exhauster driven off a Shaft from a Crossley Gas-Engine. Above Exhauster is a 4-inch Bye-Pass, enabling the Engine to be Driven at Uniform Speed.



The Crossley Gas-Engine driving a Shaft.

LOADING AND CONVEYING PLANTS FOR USE IN GAS-WORKS.

By G. Dieterich,

Engineer-in-Chief to Adolf Bleichert and Co., of Leipzig-Gohlis.

In all industrial branches which are compelled to operate with cheap raw material, the influence of suitable transport appliances has an increased importance in the formation of the price of the ultimate products in proportion to the low value of the raw material. It is a well-known fact that gas-works must use common coal—a substance of comparatively small intrinsic value; so that it can be easily understood that the question of transport plays a very important part in this branch of industry. It is, of course, necessary to correctly grasp the full meaning of the term "means of transport." It is not sufficient to create transport appliances which simply convey the raw material quickly and conveniently from one place to another, as, in this case, the erection of a light railway or similar contrivance at small first cost and with apparently low working expenses would often mean perfection in locomotion. It is, however, unfortunately too often forgotten that, under transport, not only the running or movement from one place to another must be understood, but also the loading and unloading of the bulk conveyed. This is a point very often overlooked.

It too often happens that the saving effected in the direct conveyance of coal or coke by means of so-called mechanical transport appliances is nullified by an unsuitable system of loading and unloading. Another point often forgotten is that no working plant can be erected on the site of the conveyor, and, as a consequence, the choice of a track must very often have the greatest influence on the whole course of manufacture in this respect. Transport operations in gas-works are always of an unproductive nature and of an importance disproportionate to the productive work; and consequently they exercise considerable influence on the cost price of both the staple and bye products. In addition to this, it is impossible to make arrangements in gas-works for the conveyance of material at one and the same level—*i.e.*, on a horizontal plane. There are always, and often considerable, differences of level to be coped with; so that in all gas-works the conveyance problem must be considered for both horizontal and vertical directions. Even in the case of horizontal transport, the capacity of easy motion must not be overlooked.

It but seldom happens that coal and coke for stocking or transporting can be stacked in a long and narrow heap. On the contrary, as a general rule it may be taken for granted that the transport appliance must cover extensive stacking yards; so that, to obviate manual labour, as far as possible, the transport appliance must be capable of reaching any point in such yards.

From these observations it can be gathered that the inherent properties to be looked for in transport appliances intended for use in gas-works are: (1) Possibility of transport in all directions, both horizontal and vertical. (2) Possibility of reaching any given point of the stacking yards by mechanical means. (3) Transport appliances which neither cause hindrance to the working nor exercise an adverse influence on an advantageous arrangement of the plant.

From these three requirements, it is quite clear that ordinary means of transport by rail track in immediate connection with the ground (*i.e.*, surface railway) is quite insufficient; and a system which has hitherto received comparatively little attention in commercial circles must be adopted—viz., utilization of the aërial space within and outside the buildings for the accommodation of the various appliances. This system certainly ensures the greatest possibilities of movement in all directions. In other words, the so-called aërial conveyors must be employed to the fullest extent as means of transport for gas-works. The oldest and most important examples of these are the "Bleichert" wire ropeways.

The principle of employing rails as a track is common to both aërial ways and surface railways, though in the former case they must be especially adapted to the purpose. In theory, it is only necessary by some technical means to suspend the rails of the fixed line in the air over which the transport appliances run. Of course, an aërial track, often represented by suitably strong steel-wire rope, or supplied with the well-known double rail, has special properties not possessed by surface railways. In particular, it must be taken into account that the single loads to be carried by the suspension rails or carrying ropes must not be so large as those carried by a surface railway. The result would be a smaller transport capacity which would very unfavourably affect the capacity of aërial railways if this disadvantage were not outbalanced by other means. The weight concentrated in trains on ordinary railways is split up into smaller single loads, which, instead of being carried as a complete train, follow one another in continuous succession at short intervals.

The method of driving such divided loads is usually also of a different character from that employed on ordinary railways. For the latter, the adhesion principle is often adopted, with the known drawback that the railway can only overcome comparatively low gradients. For aërial railways—at least as far as wire ropeways come into consideration—traction ropes in continuous motion, with guided driving, are employed; the natural consequence being that gradient climbing on such railways is not confined within any fixed limits. On the contrary, by this system any given gradients can be overcome; even those of 45 degrees being quite possible and safe in the working. In the last few years, aërial locomotion has experienced a further development by the introduction of electric driving. By this method, though the combined weight is split up into small loads, the guided driving on the track is dropped, so that other means must be adopted for surmounting heavy gradients.

The advantages of aërial transport were grasped at an early date by the gas industry. As long ago as the year 1876, the gas-works in Hanover, as pioneers, erected a wire ropeway for the transport of coal from the Kirchengarten station to the works. A description of this wire ropeway was presented at the eighteenth annual meeting of the Society of Gas and Water Experts, and the scheme was carried out in accordance with the system of the inventor of modern wire ropeways, the well-known Leipzig Engineer Adolf Bleichert—a system which, with the extraordinary perfection attained in the course of decades, still remains the foundation on which the whole of this industry has been built up. Even at that early date, the great superiority of aërial transport plants, from an economical aspect, was most emphatically demonstrated. This line, built thirty years ago, has a total length of 1125 metres, of which upwards of 575 metres form the open line; whereas the adjoining sidings and the suspension rails through the various retort-houses and coal-stores extended to a length of 550 metres.

Although manual labour was largely employed in handling the cars on the sidings, nevertheless, even shortly after the inauguration, the working expenses came out at barely 4¾d. per ton, as compared with 1s. per ton under the previous cartage system. Considering the small quantity of 180 tons for a period of ten hours, this result was a most remarkable one, and naturally of decisive influence on the growth of aërial ropeways. The further development of the Bleichert system—brought to the highest perfection by Messrs. Adolf Bleichert and Co., of Leipzig—has resulted in a reduction in the cost from 4¾d. per ton, which was then necessary, to something less than 1¼d. per ton at the present day for a large plant built under similar conditions; whereas the hourly capacity for a single line has risen tenfold—from 20 to 30 tons to from 200 to 300 tons.

In this and succeeding articles a description will be given of transport plants for gas-works erected by this firm; and in order to appreciate, even in some small degree, the point reached in the development of this industry, the two largest transport tracks in the world which have as yet been erected for gas-works must be considered. These are the coal and coke transporting plant in the station of the Imperial Continental Gas Association at Mariendorf, near Berlin, and the one built for the Berlin Municipal Gas-Works at Tegel-Wittenau, in the same district. Both plants, as well as all installations mentioned in this article, were designed and carried out in every detail by the above-named firm. The former station, as it now stands, has a daily production of 240,000 cubic metres of gas, and can be enlarged for an increased annual output of 250 millions. The latter has a production of 300 million cubic metres, which can be increased to about a million cubic metres daily. With regard to the transport appliances, both of these establishments are exceedingly interesting, because, in spite of the employment of similar means and of their like object, they show a great contrast in the details adopted.

It is still undecided as to whether the stacking of coals in the open or in sheds is preferable, although this would seem to be only a question of arithmetic. In each separate case, the calculation must be made whether the loss in gas renders the erection of sheds a paying matter, as it naturally causes considerable expense, and proportionately increases the cost of stacking the coal. It must not, however, be forgotten that the employment of sheds, rightly constructed, may result in a substantial simplification of the transport arrangements, as they can be rendered more effective with a smaller invested capital than when in stacking yards. It is for this reason that the Mariendorf and Tegel plants are so instructive, representing as they do two examples in which provision is made for stacking both in sheds and in the open.

The expert in gas matters will find other points of interest in these plants. At Mariendorf, the mechanically driven suspension railway, with its cranes and bridges, simply serves to carry out the coal-stacking traffic. It begins at the arrival station of the coal at the port, and ends at the retort-houses, where it delivers the coal to the transport bands of the storage hoppers. At Tegel, the railway commences also at the point of arrival of the coal; but it is there employed from start to finish through the whole course of manufacture, including that of the bye-products, and even undertakes the transport of such of the latter as are of a solid nature. The plant ends at the points where the bye-products—coke in particular—are again loaded at the ship's mooring-place or on the railway.

(To be continued.)

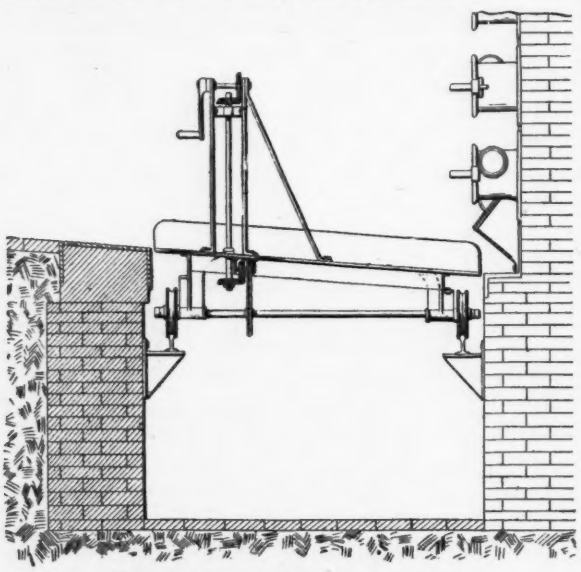
The present production of commercial 90 per cent. benzol in Great Britain may be taken at from 4 to 5 million gallons per annum, one-third of which goes for export.

At a recent meeting of the Paris Académie des Sciences, M. Foix submitted a communication on the subject of the radiation of incandescent mantles. He showed that the sole function of the thorium oxide is to form a support for the cerium oxide.

SOMETHING FOR SMALL GAS-WORKS.

In the United States, where there are a large number of gas-works which have from only four to eight settings of the half-depth and three-quarter depth regenerator pattern, it was for many years felt that attention ought to be given to the way floors were built, as under ordinary conditions the well-known arrangement of pit, covered with girders and floor plates, left much to be desired. In the first place, a continuous floor means expense on capital account; and there is also to be considered the arduous nature of the work whenever any clinkering operations are being conducted. In the necessarily shallow pits, the temperature was hardly suitable for human toil, as with only one or two plates removed, and no openings in the side of the pit, the ventilation was practically a negligible quantity. Another quite important point is that, with a covered pit, there is always a liability of the furnace being "suffocated," as the arrangements for admitting primary and secondary air are sometimes mere matters of chance—likely to be upset by carelessness on the part of the men. It is true that this latter difficulty is appreciated in this country, and several places could be named where a channel has been made for the air supply by fitting a box-tube into the web of the channels forming the buckstays. But even here there is liability to choke.

It is interesting to note what has been done in other countries in this respect, and a correspondent in the Middle West of the United States sends a few particulars. The matter was taken up some 25 years ago, when Mr. John Dell, of St. Louis, Missouri, installed a number of movable platforms (each made the length of one bench) on which the stoker wheeled his coal-truck ready for charging the retorts. On completing one bench, it was then necessary for him to get down into the pit and push the platform along to the next bed. It will be understood that this arrangement saved money in the first cost for floor, and gave better ventilation to the pit, and, of course, also a free and full air supply to the furnaces. In fact, the whole scheme turned out well, and our correspondent reports that a number of this pattern of platform are still to be found in America working well after many years of continual use.



Mitchell's Travelling Retort-House Platform.

The only trouble was the time and exertion needed for moving the platform along when finished with on one bed and required on the next; and in due course Mr. Dell took the matter up with one of his engineering friends, Mr. K. M. Mitchell, of St. Joseph, Missouri. The result was a combination of movable platform and gearing which enabled the workman to move the platform while standing on it. A United States patent was granted for the idea in March, 1904; and on this being assigned to Mr. Dell, he had a machine made which he tried first at the St. Louis World's Fair, when it was noted how easily the platform could be moved by means of the gearing—the handle being turned by a boy ten years of age. The English patent for the invention was abstracted in the "Journal" for Oct. 10, 1905 (p. 120).

The framework is built of 5-inch by 9-inch channels, braced with 3-inch by 3-inch by $\frac{3}{8}$-inch angles having 6-inch by 6-inch by 2-inch angle cleats for attaching the various parts; each cleat being provided with two 1-inch rivets on each flange. The frame carries a cast-iron floor, which is made in six plates 3 ft. by 3 ft. $2\frac{3}{4}$ in., of $\frac{5}{8}$-inch metal, with $\frac{5}{8}$-inch by 1-inch diagonal strengthening ribs. Four $\frac{1}{2}$-inch bolts secure each plate to the frame, and thus stiffen it. The floor has 6-inch end-guards formed of 7-inch plates $\frac{5}{16}$-inch thick; and the working area measures 9 ft. by 6 ft. $5\frac{1}{2}$ in. Four 9-inch wheels carry the platform when running on rails (as shown), and they are mounted on $1\frac{1}{2}$-inch diameter turned shafts, working in roller-bearings, which are in turn bolted to the 5-inch channels.

The driving gear is placed in one corner of the platform—right away and clear of the bench, so as to leave the stoker unimpeded when charging and drawing the retorts. It comprises a bevel-gear 8 inches by 12 inches diameter connecting a $1\frac{1}{2}$-inch carrying shaft and $1\frac{1}{4}$-inch vertical driving shaft. The latter works at the bottom in a bearing which is cast in one with the bearing of the $1\frac{1}{2}$-inch shaft, so as to keep the wheels always in correct gear. On the head of the vertical shaft is a set of mitre wheels 6-inch by $2\frac{1}{4}$-inch; the driver being keyed to a 1-inch shaft attached to, and actuated by, a 16-inch throw handle. The vertical shaft runs inside a 4-inch diameter cast-iron column bolted to the floor plates and at the same time to the double gear-bracket below—thus ensuring perfect alignment of all the shafts. The column is provided with a head flange, on which is bolted the double bearing bracket for the top mitre gear.

In practice, it is found that one platform is sufficient for six beds of eight retorts. A number of these geared movable platforms are in use in America; but although the idea is patented in this country, no platforms of the kind are yet in use as far as we know.

It should, however, be mentioned in this connection that a "travelling platform arranged level with the charging-floor of a retort-house, and adapted to run along rails supported by angle-irons bolted to the buckstays" was described in Dempster and Scott's patent No. 10,926 of 1904 (see "Journal" for April 25, 1905). A pair of photographs of such a platform, as erected at the Galashiels Gas-Works, were published in the "Journal" for Aug. 23, 1904, p. 534.

CHEVALET'S GAS-PURIFYING PROCESS.

M. Fernand Chevalet, whose name is known to many gas engineers in this country in connection with his investigations into the chemistry of gas manufacture, more especially the branch of it which bears upon purification, has lately taken out a French patent for a process of purifying gas whereby he not only effects this object, but enhances the value of the materials employed in it. The following particulars in regard to the process are taken from the specification.

The removal of the sulphuretted hydrogen from coal gas is usually effected by means of a mixture of sawdust or cork and oxide of iron. For this mixture M. Chevalet substitutes zinc or copper ores which have been previously roasted in order to remove their sulphur. After having been subjected to this treatment, the ores contain, according to the temperature employed, zinc and copper oxides, and even sulphates of these metals, as well as uncalcined zinc and copper sulphides. The roasted ores are used alone or mixed with sawdust, and in this form they are suitable for the purification of gas. At first they act badly; but on revivification, especially with a little ammonia or ammoniacal salt, they become much more effective.

The feature of the invention which gives it its special economic value is that the ores constituting the purifying material undergo prior treatment which subsequently facilitates the extraction of the metals they contain—viz., zinc, copper, cadmium, and even silver. It is common knowledge that to treat zinc ores by the wet method, especially when they contain copper and iron in the form of sulphide, they have first to be roasted, and then the oxides are dissolved. The liquor resulting from the manufacture of coal gas contains carbonate, hydrosulphate, and a little hydrochlorate of ammonia. The roasted ore, moistened by this liquor, which sulphurets the copper and the zinc, is exposed to the air. This oxidizes the sulphides, which are then dissolved. The operation is repeated several times; and the more frequently it is performed, the greater is the action upon the oxides and the uncalcined sulphides of zinc and copper, and the more effectual is the purification of the gas.

The following is the sequence of operations for the treatment of the ores after their removal from the purifiers. When it is estimated that they have been thoroughly saturated, they are washed with crude ammonia solutions or ammoniacal liquor in closed vessels, to prevent loss of ammonia. This is continued until all that can be rendered soluble is removed. The washing solutions are conveyed to the still for taking out the ammonia, which is then condensed in coolers in order to produce more or less concentrated liquids for washing the oxidized ores. The dissolved zinc oxide is precipitated in the form of more or less fine sludge; and the clear water contains nearly all the copper in the form of sulphate. The process described may be regarded either as an improvement on the ordinary plan of treating zinc ores with ammonia, or as a method of purifying coal gas.

Gas Supply of the Prussian Railways.—According to the latest statistics in regard to the working of the joint Prussian and Hessian State Railways, the quantity of gas made at 104 works attached to the system was 715,916,000 cubic feet. Of this total nearly 34·6 per cent. was used for railway-carriage lighting; while 3·68 per cent. was sold to the Post Office, other railways, and private persons. At the end of the period embraced in the statistics, 196,277 gas-burners were in use, of which 73 per cent. were on the incandescent system, and 125 gas-engines were supplied. The gas made was of the following kinds, in the proportions stated: Coal gas, 47·81 per cent.; oil gas, 0·11 per cent.; mixed gas, 36·41 per cent.; water gas, 14·84 per cent.; acetylene, 0·15 per cent.; various forms of air gas, 0·68 per cent.

PRODUCTION OF AMMONIA DURING THE DRY DISTILLATION OF COAL.

(*Concluded from p. 29.*)

Effect of Dilution.

Experiments were next carried out in order to see if a larger yield of ammonia from a given coal could not be obtained by diluting the gases, so as to reduce the partial pressure of the ammonia and its tendency to dissociate. The first tests were made with the Heinitz coal already employed, and in the same conditions as before, except that from the time the temperature reached about 350° C. (first evolution of gas), to the end of the three-hour run, a slow current of carbon dioxide was passed through the plant at such speed that 1 litre was used altogether. The results obtained are shown in Table X., and are graphically portrayed in fig. 7, where the thick line is identical with that in fig. 3, representing the natural yield of ammonia, while the thin line indicates the effect of the carbon dioxide.

Table X.

Temperature.	Percentage of Total Nitrogen Found.		
	In Coke.	As NH_3.	Elsewhere.
600	71·7	9·8	18·5
700	69·5	18·1	12·4
800	64·3	20·2	15·5
900	61·9	20·0	18·1

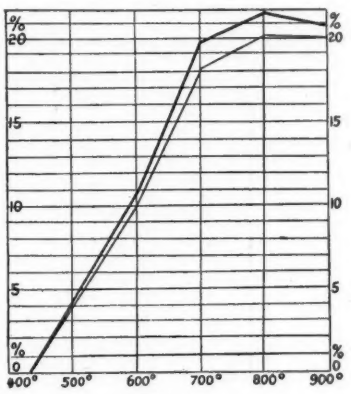


Fig. 7.

It will be evident that the current of carbon dioxide—or of monoxide, as the dioxide began to decompose with rising temperature—increased the proportion of nitrogen converted into a volatile form, but decreased the yield of ammonia. The decrease in the yield of ammonia brought about by the presence of carbon dioxide appeared to be 0·9 per cent. less at 900° than at 800° C.

Parallel tests performed on the other three coals at the temperature of 800° C. only gave similar results. The first Ilseder coal showed but a small loss of ammonia; the second showed a loss of 2·5 per cent. of ammonia and a gain of 3 per cent. in other forms of volatile nitrogen; the third showed a loss of 4·8 per cent. in the ammonia and a gain of 6·5 per cent. elsewhere, 1·7 per cent. more nitrogen being gasified. The influence of the carbon dioxide or monoxide thus varied with the different coals, being most conspicuous when used in conjunction with the most recent brown coal. Evidently the carbon dioxide played some chemical part in the process of carbonization.

When nitrogen was employed as the diluent during the treatment of the Heinitz coal, the yield of ammonia was increased, as shown by the two tests recorded in Table XI.

Table XI.

Temperature.	Percentage of Total N recovered as NH_3.			
	(1)	(2)	Average.	Without Current of N.
600	10·2	11·1	10·7	10·6
700	20·7	20·1	20·4	19·6
800	21·6	22·0	21·8	21·7
900	21·7	22·5	22·1	20·8

Although part of the system, the nitrogen can be regarded as a perfectly indifferent gas, for a synthesis of ammonia is not conceivable in the conditions prevailing. Hence it acts beneficially upon the ammonia.

Effect of Ferrous and Calcium Carbonates.

In Table XII. are collected the results obtained on carbonizing the same "Heinitz" coal at 800° C. in presence of different proportions of ferrous carbonate, ferrous oxide, and ferric oxide. The materials added to the coal were very finely powdered and intimately mixed therewith; the ferrous carbonate in the first three tests being a spathic iron ore containing 1·2 per cent. of SiO_2, 46·3 per cent. of FeO, 12·6 per cent. of MnO, 1·1 per cent. of CaO, 3·3 per cent. of MgO, and 33·5 per cent. of CO_2. In the second three tests, the substance added was an oxide prepared by igniting the ore, the quantities used corresponding with the stated proportions of undecomposed carbonate. In the last three tests the substance introduced was pure ferric oxide.

Table XII.

No. of Test.	Substance Added (See Text).	Percentage of Total Nitrogen Found.		
		In Coke.	As NH_3.	Elsewhere.
1	2 per cent of $FeCO_3$	50·87	18·07	31·06
2	5 " " " "	50·17	18·28	31·55
3	10 " " " "	49·38	18·56	32·06
4	2 " " of FeO	61·40	18·04	20·56
5	5 " " " "	59·44	18·15	22·41
6	10 " " " "	58·16	18·13	23·71
7	2 " " of Fe_2O_3	58·20	17·93	23·87
8	5 " " " "	58·07	17·47	24·46
9	10 " " " "	58·27	17 31	24·42
	Coal alone	65·20	21·70	13·10

The figures for the coke show a decrease in the make of a little less than 1 per cent., and a small decrease in the proportion of nitrogen in it; but, expressed as a percentage of the total nitrogen in the coal, that remaining in the coke was reduced some 15 per cent. by the iron. The tests with ferrous oxide indicate that the diminished yield of ammonia was not due to the carbon dioxide liberated from the ferrous carbonate, but to the iron oxide, or the reduced metal, acting as a catalytic agent. In test No. 3, the proportion of elementary nitrogen was 24·35 per cent.

Table XIII. records the results obtained on adding similar proportions of calcium carbonate to the same coal at 800° C., or of introducing equivalent proportions of calcium oxide.

Table XIII.

No. of Test.	Substance Added (See Text).	Percentage of Total Nitrogen Found.		
		In Coke.	As NH_3.	Elsewhere.
1	2 per cent. of $CaCO_3$	61·92	21·50	16·58
2	5 " " " "	61·54	23 41	15·05
3	10 " " " "	59·92	23·67	16·41
4	2 " " " CaO	63·66	21·61	14·73
5	5 " " " "	61·23	23·88	14·89
6	10 " " " "	60·76	24 14	15·10
	Coal alone	65·20	21·70	13·10

Hence, although both iron and carbon dioxide are inimical to the production of ammonia, lime exerts a favourable action, as Schilling has already proved is the case.

Effect of Steam.

The last point investigated by the authors was the effect produced upon the yield of ammonia by passing steam over the four coals already examined, at the four different working temperatures. The carbonization was first carried out in normal conditions for the usual period of three hours; then a current of very wet nitrogen was turned on, and the heat was maintained until the whole period of time mentioned in Table XIV. had elapsed from the commencement of each test. The nitrogen was made to bubble gently through water kept constantly at 95° C., the boiling point being avoided, as the evolution of steam was then irregular. The quantity of steam was nearly twice the weight of the coal. The results obtained with the Heinitz coal are shown in detail in Table XIV., the figures representing the yield of ammonia at the temperature and in the time mentioned, expressed as a percentage of the total nitrogen evolved at the said temperature and time. The figures are reproduced as curves in fig. 8, where the ordinates are the percentages in question and the abscisæ the total hours spent in heating the coal.

Table XIV.

System of Heating.	Time Occupied.	Percentage of Total N obtained as NH_3 at			
		600°.	700°.	800°.	900°.
Alone	3 hours	10·83	19·17	21·38	20·57
With steam	6 "	13·04	20·85	23·12	23·84
"	9 "	3·17	8·53	9·64	5·35
"	12 "	1·84	5·10	6·12	2·21
"	15 "	0·17	3·17	3·71	—
"	18 "	—	1·50	2·14	—
"	21 "	—	—	1·12	—
Totals		29·05	58·32	67·23	51·97

It will be noticed that the effect of the steam in increasing the

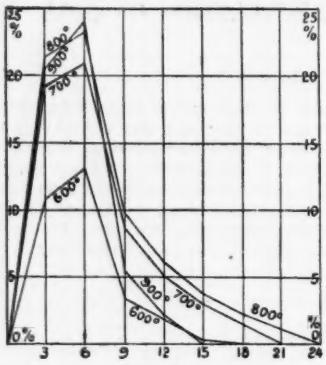


Fig. 8.

yield of ammonia rose with the temperature up to the usual maximum of 800° C.; and that the bulk of the ammonia—from 49 to 56 per cent. of the total—was evolved during the first six hours of introducing steam. If only this period is considered—*i.e.*, six hours of steam introduction after three hours of ordinary carbonization, it will be apparent that the amounts of ammonia considered as proportions of the total nitrogen were 27·04 per cent. at 600°, 48·55 per cent. at 700°, 54·14 per cent. at 800°, and 49·76 per cent. at 900°. The latter figures are interesting, because they show that similar yields of nitrogen are to be obtained in five or six hours from the beginning of carbonization, if steam is introduced from the start; and also that temperatures of 900° or 1000° C., such as are requisite in the manufacture of a useful water gas or semi-water gas, may be employed without detriment to the ammonia.

The results obtained on treating the three other coals already described with steam in the manner just detailed are represented in figs. 9, 10, and 11 respectively. Since the curves are all very similar, the tables containing the individual data from which they are constructed have been omitted. Fig. 12 shows the total yield of ammonia expressed as a percentage of the total nitrogen obtained at different temperatures from the same four coals in the presence of steam.

Conclusions.

The conclusions drawn by the authors from the foregoing research may be summed up as follows: The amount of ammonia obtained on carbonizing any particular coal depends chiefly upon the composition of the coal, and upon the fact that at high temperatures where gaseous ammonia is very unstable it yet exhibits a certain sluggishness in dissociating, which enables part of the make to be recovered. Hence the design of the carbonizing vessel plays an important part in determining the yield; for the higher the proportion of ammonia in the coal gas, the larger the incandescent retort surface with which it comes into contact, and the longer the time during which it remains in contact with that surface the smaller must be the amount of ammonia capable of recovery—rules that apply equally to all other industrial operations where ammonia is evolved at a high temperature. The presence of carbon dioxide or monoxide assists in the gasification of the nitrogen in a coal at high temperatures; but the greater part of the ammonia originally liberated is simultaneously decomposed into its elements. The tendency of ammonia to dissociate is increased by such catalytic substances as iron and its oxide; wherefore the amount of ash in a coal may, on occasion, be an important factor. It is easy to see why one and the same coal should give different quantities of ammonia when it is treated differently. In a horizontal retort, where the gas streams over the whole hot surface, the ammonia has every opportunity to dissociate; but in a vertical retort, where it escapes quickly through

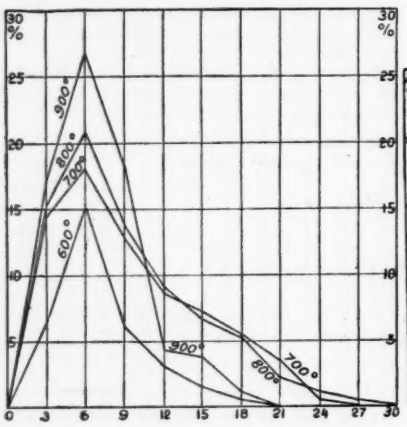


Fig. 10.

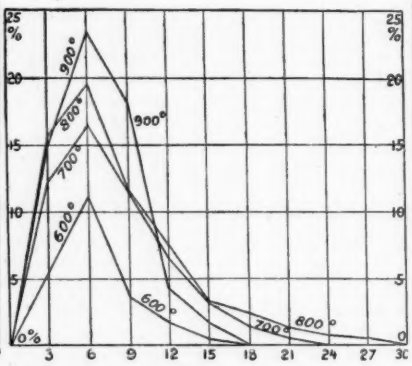


Fig. 9.

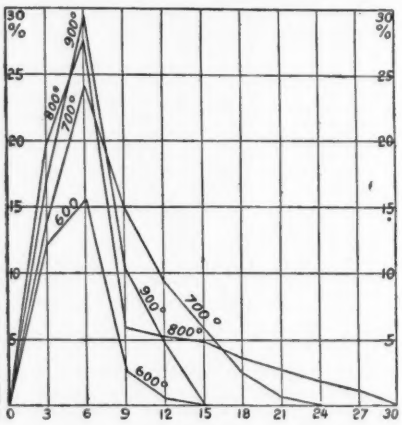


Fig. 11.

the central cool layers of coal, it is better protected. The maximum yield of ammonia during the dry distillation of coal is obtained about 800° C. More elevated temperatures cause the gasification of more nitrogen and the momentary production of more ammonia; but the latter only dissociates, and increases the final yield of free nitrogen.

When a coal is carbonized in a current of steam for the purpose of increasing the output of ammonia, the maximum yield is also obtained in the neighbourhood of 800° C.; but with the practical object of preparing a good power gas, it is better to work at a somewhat higher heat. About 50 to 60 per cent. of the nitrogen of the coal should be recovered in the form of ammonia. Undoubtedly the use of steam is an excellent method to adopt for the manufacture of power gas and of ammonia from a fuel of inferior quality—*e.g.*, peat or brown coal—as Grouven found to be the case many years ago, and as Mond has more recently demonstrated on a large scale at Northwich.

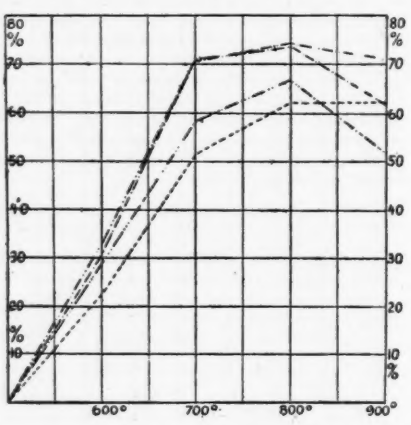


Fig. 12.

The Northumberland and Durham Coalfield.—Some readers may be aware that the North of England Institute of Mining and Mechanical Engineers have published several volumes containing a valuable collection of details as regards the borings and sinkings in the above-named coalfield. This record is in constant consultation by all who are interested in coal; but it is not easy to understand except by experts. Its contents need interpretation. We learn that this useful task has been performed by Mr. John Kirsopp, jun., F.G.S., who has just brought out a portfolio of sections which may be aptly described as a key to a vast mass of highly important but unclassified information. It contains twenty sheets of vertical plotted sections of the depths and thicknesses of coal seams, &c., passed through in various shafts and boreholes throughout the field, including a map showing the position of all the collieries, with their railways and shipping connections, and the outcrop of the Hutton and Brockwell seams, revised and corrected up to date. It is unnecessary to emphasize the advantage which a pictorial representation of a number of detailed sections possesses over written accounts of them; for by their aid the eye can at once take in what otherwise would require much concentrated thought and consideration. In bringing out his portfolio, therefore, Mr. Kirsopp has shortened and facilitated the labours of all those who are in any way connected with the winning of coal, or engaged in buying or selling it. The portfolio is published by Messrs. R. Ward and Sons, of Newcastle-on-Tyne, at the price of £4 4s. net.

WAVERLEY GAS ASSOCIATION.

Annual Meeting in Edinburgh.

The Ninety-First Meeting of the Waverley Association of Gas Managers was held in the Royal British Hotel, Edinburgh, on Friday last. Mr. W. YOUNG, of Penicuik, occupied the chair. The meeting was a large one—showing that the change in the working of the Association this year has met the approval of the members.

The PRESIDENT, in the name of the Association, gave them all a hearty welcome. They had, he said, entered upon a new era, as it were; and he was sure that the meeting would be both enjoyable and beneficial to them all. He was delighted to see so many present.

PRESIDENTIAL ADDRESS.

The PRESIDENT then delivered the following address:—

My first word must be one of thanks for the honour you have done me in electing me President of your Association for the year. Though well acquainted with the secretarial duties connected with the Association, I confess I viewed with trepidation the idea of being advanced to the chair, and of preparing a Presidential Address. It is recorded in past minutes of the Association that on three occasions our respected and esteemed member, Mr. Bell, of Dalkeith, took the chair, when for various causes the President for the year could not, or would not, appear; and I believe he is still ready for such an emergency. But I should be sorry to make such a call on his good nature; and I therefore face the ordeal myself, though I am afraid my address will be suggestive of the substance which a famous German chemist, for want of a better term, called "*parum affinis*" (in course of time corrupted to paraffin), which name he gave because it was little allied to anything that had ever been heard of before. But as our programme of business is a lengthy one, I am relieved from the necessity of inflicting a long address upon you; and so, avoiding in the main all technical topics, I shall content myself with touching lightly on a few salient points connected with the business of the Association during the year, or, it may be, during the past years of its existence—for I do not forget it has made, or is about to make, a new departure.

In the first place, I may state that, in accordance with a motion made at the meeting in Peebles, in April last year, the Committee which was then appointed held several meetings in Edinburgh, and drew up rules, copies of which have been forwarded to each member within the past fortnight, and which will be shortly submitted for your approval or disapproval. In other words, we have fixed upon a Constitution. We Britishers have got along pretty comfortably without a Constitution, for, with the exception of the Magna Charta and the Claim of Rights which was drawn up in 1688, and a few important documents of a kindred nature, we have no written Constitution such as exists in France and the United States—and of the former of which it was at one time said that it changed its Constitution once a month. As with nations, so with societies. Having got along for forty-six years without the semblance of a Constitution, there might at first sight appear no valid reason why we should not celebrate the centenary of the Waverley Association without being tied up with one; and yet, on mature consideration, we believe the expediency of having a Constitution will be apparent. Two persons were proceeding to church together, when one expressed a fear that they would be late, and called upon the other to run, but was met by a blank refusal. In this case the expected happened—both were late for service; and when taken to task, the refractory friend replied: "But see how we preserved our dignity." So this Constitution, if it does nothing else, will preserve our dignity. It comes as an afterthought; and yet it may not be too late to prefix to these "Rules and Regulations" a statement as to the premier position of our Association in Scotland—in other words, that the Waverley Association of Gas Managers was the first Association of Gas Managers in Scotland. The claim first publicly expressed by Mr. J. C. Adamson, of Airdrie, at Duns, in 1898, has been thoroughly established; and the grounds upon which it is based are set forth in the Association's minute-book, which goes back to 1871. The first minute-book was lost in Edinburgh, and that circumstance should increase the desire to have this well-established claim broad-based by being printed upon each copy of the Constitution to be placed in the hands of the members.

You will have full opportunity of discussing these rules and regulations; but permit me to make one or two observations upon them. You will observe, from Rule 11, that it is proposed that the Association shall hold annual meetings, at such time and place as shall be arranged—thus giving members a free choice to have the meetings in one centre (say, in Edinburgh) or in various centres, as has been the custom during the greater part of the Association's existence. Each method has much to recommend it. And yet to many of us the latter must have the greater charm; for is it not within our knowledge that some of the most pleasant days of our lives have been spent at these meetings, and this because of the variety of scenery and social conditions amid which we found ourselves placed? Restricting ourselves to the last twenty years, we find that during that period the Association has held its meetings at the following places: Thrice at Melrose, Selkirk, and Haddington; twice at Edinburgh, North Berwick, Dalkeith, Peebles, Penicuik, Portobello, Hawick, Kelso, Dunbar, and Duns; and once at Berwick-on-Tweed, Jedburgh, Galashiels, Innerleithen, Musselburgh, Joppa, and Loanhead. Much of the experience gleaned in these varied outings will never be forgotten. Who, for example, among the privileged company would forget that moment when Mr. Robb, the "Grand Old Man" of Haddington, unlocking the door of a cellar, showed us some of the famous Torbanehill mineral which formed a *cause célèbre* in the House of Lords—the cost of which, a legal friend informs us, swallowed up the entire worth of the mineral? But, passing on, we note one other point in the rules, and that is the fine distinction which obtains between ordinary, honorary, and extraordinary members. A club, of whose affairs we have some knowledge, has devised a scheme for increasing its finances by inviting a number of gentlemen to become honorary members at a contribution of 7s. 6d. each. Observe that from our honorary members we exact no contribution whatever—the only condition being that their scientific knowledge recommends them to the Association. From gentlemen of less scientific eminence, we shall be glad to get contributions of 2s. 6d. and 5s., as stated in the rules.

The most outstanding event of the past year, in what might be termed the annals of our Association, has been the death of Mr. William Young, of Harehope, Peebles. Able writers have already sketched his career; and one of the ablest of them, speaking of William Sugg and William Young, said: "The influence of their friendship will go through the lives of their contemporaries whose privilege it was to have close relationships; their work will be for them an imperishable memorial in the ages to come." To many of us who are members of the Waverley Association, it is the privilege to be included in the class above referred to; and that relationship will be a sacred memory. In the minute-books, the first entry of the name "Mr. Young, of Dalkeith," occurs in connection with the meeting held at Haddington on Sept. 4, 1878, at which Mr. Robb was the Chairman. There have been three generations of his family connected with gas manufacture; and the entry doubtless refers to his father, who was Gas Manager at Dalkeith till 1869, when he was succeeded by his son-in-law, Mr. Cusiter, schoolmaster—Mr. Young senior at that date being appointed assistant to Professor Penny in the work of maintaining the purity of the River Esk, the outcome of a great legal contest between the Duke of Buccleuch and the millowners on the river. But whether the entry refers to Mr. Young senior or his more famous son, it is certain the latter became closely connected with the work of the Waverley Association; and probably his most intimate friends would be found in the ranks of its membership. And in the years to come, when the romantic tale of his achievements as a scientist will be recalled only by students, there will be thousands who will gratefully recall his name and memory as one who bequeathed his estate as a sanatorium for suffering humanity.

Much of Mr. Young's life work was concerned with the principles underlying the gasification of oil; and if this had been intended to be a technical address, it is on this subject that I should like to have made a few observations. But, for reasons indicated at the outset, I must be brief. When the great Dr. Ure published his "Dictionary of Chemistry" in 1823, he referred to the experiments which an assistant of his had made in Glasgow in the perfecting of a process for making oil gas; and the learned doctor wrote in an optimistic tone of the future of the process. But after spending considerable sums of money on abortive experiments, many of us (gas managers) have ruefully to admit that the commercial success of oil-enrichment processes is still a question for the future. For the success of the future of our own special industry, however, we need have no fears.

A few years ago a member, at one of our meetings, devoted a paper to what he termed the bogeys gas managers and directors had to face; and included in the list was the question of electric lighting. Several years have passed since then; and so far our gas-works have not been relegated to the scrap heap, nor have the workmen become the most indigent in the land. About a decade before the formation of our Association, a traveller, when describing the primitive process of tar making which was carried on in certain forests of Bothnia, said that the tar workers were the most poorly paid and indigent in the country. In a sense, we are tar makers; but, so far as appearances go, there still is, for us, corn in Egypt—or, in other words, ample remuneration for services rendered. And we venture to predict that not alone, as some writers assert, because of the vast sum of money sunk in gas undertakings, will the industry survive, but because of its own intrinsic merits will it continue to be a formidable competitor to any system of lighting. In the ancient poems of the Egyptians, invocations to Râ, the Sun-god—the source of light and heat—were placed in the very forefront; and perhaps in these later days some laureate will arise who will sing in melodious verse the praises of Gas Associations who are striving to improve in their beneficent work of giving light to the world.

THE SECRETARY'S REPORT.

The HON. SECRETARY (Mr. W. Brown, of Lasswade) read his report upon the work of the year. It was stated that there were two meetings of the Committee, and that at the first it was resolved to issue reply post-cards to all the members, inviting their replies to the following questions: (1) Should the Association have, in future, one meeting only each year, instead of two meetings as formerly? The replies received were 21 in favour, and 1 against.

(2) Should the meetings be held at a fixed centre, instead of in different towns; the Committee recommending Edinburgh as the centre? The replies received were 18 in favour, and 4 against. (3) Which month do you consider most suitable for holding the meeting; the Committee suggest April? The replies received were 19 in favour, and 3 against. (4) Should the Committee have power to alter arrangements, if they deem it necessary? The replies received were 21 in favour, and 1 against. In all, 32 post-cards were issued, and 22 replies received. At the first meeting of the Committee, it was resolved to write the various gas companies and corporations, asking if they would assist in defraying the expenses of their managers attending the meetings of the Association. To this letter only four or five replies had been received in favour of the proposal, and one against; but it was understood that several managers had been promised repayment of their expenses as the result of the appeal, though replies had not been sent. A set of rules and regulations, drawn up by the Committee, were submitted. The Committee suggested as honorary members: Mr. Sutherland, of Messrs. James Ross and Co.; Mr. James M'Kelvie, of Edinburgh; Mr. John Callander, of Newbattle; Mr. J. Hepworth, of Edinburgh; and Mr. D. Macfie, of Edinburgh.

OTHER BUSINESS.

Mr. A. BELL, sen. (Dalkeith), had much pleasure in proposing a hearty vote of thanks to the President for his address. They had an entirely new departure this year. Their meetings used to be totally informal; but now they were in, as it were, the melting-pot. He hoped that things would turn out well with them. The President had raised no technical questions at all; but he mentioned the oil gas which was supplied at one time in Edinburgh. He spoke of it as an enriching agent; but it was not used as an enricher—it was supplied as an illuminant. As a matter of fact, it was carted round to consumers in tins. The Waverley Association had been the means of strengthening the hands of managers of small gas-works; and he thought it was quite a right thing that companies and corporations should be asked to defray the expenses of managers attending the meetings, as they were not present for their own personal advantage.

Mr. W. BLAIR (Helensburgh) seconded; and the motion was agreed to.

The PRESIDENT having asked if there were any amendment to be proposed upon the rules and regulations, and there being none, he declared them adopted.

Mr. J. M'LAREN (Duns) proposed that Mr. T. O'Neil, of Dunbar, be elected President for the ensuing year.

Mr. J. GEMMELL (Melrose) seconded; and the motion was adopted.

On the motion of Mr. A. BELL, sen., seconded by Mr. J. TULLOCH (Loanhead), Mr. Brown was re-elected Hon. Secretary.

The following were appointed the Committee: Messrs. A. Bell, sen., H. Rutherford (Aberlady), J. Black (North Berwick), J. M'Laren (Duns), J. Tulloch (Loanhead), W. Brown (Lasswade), and W. Young (Penicuik) *ex-officio*. Mr. J. O'Halloran (Edinburgh) was appointed Auditor.

Mr. J. TULLOCH (Loanhead) presented the President's Medal to the President, who returned thanks.

Mr. J. HEPWORTH said it was a very pleasant surprise to hear his name mentioned among the honorary members. He had been an attendant, occasionally, at the meetings of the Association; and if time would permit, he would like to come to every meeting. He held the Waverley Association in the highest esteem. As the President had pointed out, it was the forerunner of all the great institutions which were now connected with the gas industry. No Association had done better work; and he hoped that, now they had printed rules, and all the rest of the paraphernalia of an Association, they would not forsake that social element which had added so much to the usefulness of the meetings and to the pleasure of every member. He cordially thanked them for the honour they had conferred upon him.

Mr. D. MACFIE said that he could only echo Mr. Hepworth's remarks. He appreciated the honour very highly indeed, and should always continue to take an interest in the proceedings of the Association.

Afterwards the members and friends, to the number of about seventy, sat down to dinner, after which Provost Smith (Dunbar) proposed the toast of "Success to the Waverley Association," and in doing so said he felt very highly the honour they had conferred upon the Gas Manager at Dunbar, in making him their President. He was well worthy of the high position.

Mr. U. RUTHERFORD (Aberlady), as the oldest member of the Association present, responded.

Motor buses, provided by Mr. James M'Kelvie, were in waiting by this time. In these, the company drove to the Central Fire Station, where Firemaster Pordage and his officers showed them the arrangements for prompt turning out; and the visitors inspected the valuable plant in the station. A turn-out was ordered, and was accomplished in the almost incredibly short period of seven seconds. Before leaving, Mr. A. Bell, sen., expressed the thanks of the Association to Mr. Pordage for giving them the opportunity of seeing the station. The drive was then resumed; Queensferry being reached at a quarter past four. Mr. M'Kelvie there joined the party. The ferry steamer "Forfarshire" was found at the quay, and took the visitors, in a choppy sea, caused by the persistent east wind which had been experienced for nearly a week, across the Firth of Forth and back again, passing twice under the Forth Bridge. On landing, tea was served in the Hawes Inn, at the close of which Mr. W. Brown, the Hon. Secretary, proposed a vote of thanks to Mr. M'Kelvie for his kindness in providing the drive, sail, and tea for them. Mr. M'Kelvie briefly acknowledged. The party then returned to Edinburgh.

LONDON AND SOUTHERN JUNIOR ASSOCIATION.

A Visit to Luton.

There must have been about a record muster last Tuesday, when the members of the London and Southern District Junior Gas Association visited Luton and inspected the new works of the Davis Gas-Stove Company, Limited, and the works of the Luton Gas Company. The programme was a full one; and a very busy and thoroughly enjoyable day was spent by the party, numbering eighty or more.

THE NEW DAVIS GAS-STOVE WORKS.

The visitors were first of all the guests of the Davis Gas-Stove Company, to whose works brakes were in waiting at the station to convey them on arrival of the train, to which special saloon carriages had been attached. On reaching their destination, the party were received by Mr. Henry J. Davis, the Chairman of the Company; Mr. Cyril G. Davis and Harold N. Davis, Directors, and Mr. George Goatley and Mr. W. S. Gilbert, representatives, being also present. They sat down to an excellent lunch; and afterwards Mr. H. J. Davis, who presided, said that, as Chairman of the Company, it was his duty and his pleasure to welcome the guests. Remarking that there was no use in disguising the fact that the present was the day for young men, he referred to the large part taken by his sons in the starting of the new works. To his eldest son and to Mr. Aitken, as Manager, great credit was due, because there was no doubt that what had been done had necessitated a great amount of anxiety and labour. Considering that only eight or nine weeks had elapsed since they commenced to cast at the new works, it could not be expected that everything would be found in full swing; but satisfactory progress had been made. If there was nothing there to instruct them, he hoped at least they would be entertained. In another twelve months' time things would be in better shape; and he hoped the Association would then visit the works again.

The President (Mr. W. Upton), in proposing the hearty vote of thanks to their hosts, said he thought it was a great privilege to be able to visit the works. Very much depended upon the gas-stove, which was an appliance that had had a most important influence on the industry. He thought they would agree with him that, had it not been for the gas-stove, they might still have been in the days of 18 and 20 candle power gas. A few years ago, they thought of gas companies as signifying lighting companies; but now they were all keen on the power and heating side of the business. Of course, the incandescent burner in time would have done a great deal; but they had to recollect that things in this country moved but slowly, and if they had only had the incandescent burner they might, in his opinion, have been another twenty years before they found themselves in the position as regarded gas manufacture that they occupied to-day. But even now the number of gas-cookers in use was very far from what it might be; for he saw no reason why every gas-consumer should not have one. A gas-stove in every house should be their goal. The trouble and expense that their hosts had gone to in fitting up the new works, showed that they had faith in the gas-stove. They ought to be thankful that the conditions had brought forward a class of gentlemen who had devoted themselves and their capital to the production of such apparatus, because gas managers were so busily engaged in the manufacture and distribution of their commodity that they had not the opportunity—nor would it be a business proposition—to enter into the stove trade. It must have put the Company to a considerable amount of trouble to have the Association there that day, when the works had been open so short a time; and he trusted they might some day visit them again in the full tide of their prosperity. He proposed that they should show by acclamation their appreciation of all that had been done for them.

The proposal was seconded by Mr. J. W. Liberty, who remarked that it was no idle hour they were passing there, and it was a pleasant afternoon they had in view, but a really instructive time. He believed that there was no finality whatever as regarded gas lighting, cooking, and heating; and they had come down there with their eyes wide open to see all that they could. Gas stoves and cookers had loomed rather large lately in the proceedings of their Association; and they hoped that day to solve some of the questions that had been raised. As the President remarked, the gas-stove was one of the things that were going to tell; and given a cheap gas of low illuminating value and high calorific power, it had nothing to fear. They were very pleased to be the guests of the Company; and no doubt they would all go back and put into practice what they learnt.

The vote was heartily accorded, and was briefly acknowledged by Mr. Davis, sen.; and the visitors then proceeded to inspect the works.

The first thing that impressed the party on entering the shops was the light and airy character of the buildings, which is such as to almost give rise to a feeling of envy of the men whose lot it is to work there. Everywhere there appears to be plenty of room; but in spite of this, plans are already in hand for extending the moulding shop (the present area of which is 80,000 square feet) by a further 12,000 square feet. So far nearly a hundred men in this department have been imported from the Company's Falkirk foundry; and when this extension is completed, room will be found for the remainder of the men employed there. The castings made are not, of course, confined to what are required for the manufacture of gas-stoves, but include those needed for building and other purposes. The party first ascended to the platform from which are charged the two American furnaces, each capable of melting 18 tons of iron per hour, and the blast for which is obtained from a Buffalo fan driven by a 75-horse power electric motor. Then, returning to the ground, they saw the molten metal run off and conveyed to the moulds. The other shops were then inspected, and afterwards the warehouses, in connection with three of which there is a covered-in railway siding—in fact, practically a small station—which permits of the easy loading of trucks with goods for despatch.

The fitting shop is divided into two parts—one of which is for ranges, grates, &c., and the other for gas-stoves. At the end of the latter portion are two small gasholders, and the necessary apparatus for testing all stoves before they are passed into the warehouse. At present, the bulk of the Company's stoves are fitted at the London works; but the Luton fitting shop will be largely extended as soon as possible, to meet the requirements of the Midland and Northern trade. In connection with this branch of the work, an interesting demonstration was given to the visitors; a man who had been on the works not quite three weeks, showing how quickly he could, single-handed, take to pieces and put together again a Davis cooker, No. 4 B, new pattern. The first operation of taking the cooker to pieces was completed in the short time of 4 min. 25 sec.; while in putting together again he occupied 7 min. 45 sec. The nuts were all properly tightened, and the cooker was fitted and finished ready for the market.

LUTON GAS COMPANY'S WORKS.

A move was then made to the gas-works, over which—in the unavoidable absence of the Engineer, Mr. W. R. Phillips, and his son Mr. W. Phillips—the party were shown by Mr. J. M. Campbell and Mr. E. Seaborn. The undertaking furnishes a good example of what, fortunately, gas men are well accustomed to—that is, a continually growing business. The make of gas (which at present amounts to 320,000,000 cubic feet per annum) has doubled within the last twelve years; the increase in 1906 over the preceding year having been 3·34 per cent. The quantity of coal carbonized last year was 28,490 tons; the yield of gas being 11,235 cubic feet per ton. The coke made is about 13 cwt. per ton of coal; and of this some 16 per cent. is used for firing, and 10½ cwt. are sold. There are 38 miles of mains; and the proportion of unaccounted-for gas is something like 5 per cent. The largest day's make of gas has been 1,407,000 cubic feet. The Company have 5000 ordinary and 3800 prepayment consumers; while there are 800 public lamps, 350 of which are fitted with incandescent and 450 with flat-flame burners. The charges for gas (which is kept well above the prescribed illuminating power of 16 candles) are 2s. 2d. per 1000 cubic feet to ordinary consumers, and 2s. for engines using over 500,000 feet per annum—which must be regarded as satisfactory rates from the customers' point of view, especially taking into account the fact that the Company have to pay 8s. 3d. per ton for the carriage of their coal. The Company have their own sidings into the works, served by a branch line of the Great Northern Railway.

The visitors naturally started their inspection at the retorts, for which scoop charging is employed—there being no machinery in use. In the new retort-house there are fourteen beds of sixes, through settings, all fired on the regenerative system; and alongside are coal-sheds, on the top of one of which is fixed a cast-iron water-tank supplied by a pump in the washer-house. The other retort-house contains eleven beds of sixes, single retorts, direct fired, and six beds of sixes, single retorts, on the generator system, which latter were at work. There are several of the arches in process of demolition, with a view to rebuilding with generator settings. Passing to the other portions of the plant, it may be remarked that there are three Donkin exhausters, the capacities of which are 75,000, 50,000, and 30,000 cubic feet per hour respectively. The Pelouze and Audouin tar extractor and the Holmes washer are both of 2,500,000 cubic feet per day capacity; the Kirkham, Hulett, and Chandler and Livesey washers, both of 1,000,000 cubic feet; and the Morris and Cutler condensers, of 750,000 cubic feet. There are three sets of purifiers, consisting of nine boxes in all—both lime and oxide being used. The available gasholders number four, with a total capacity of 1,300,000 cubic feet—the smallest containing 160,000 feet, and the largest 678,000 feet. Sulphate of ammonia manufacture is carried on; the output being about 295 tons a year.

After the inspection, the members took tea, on the invitation of Mr. Phillips, at Clark's Restaurant, when opportunity was taken by Mr. Upton to ask Mr. Campbell to convey the thanks of the Association to the Gas Company and to Mr. Phillips for the privilege of looking over the works and for the entertainment that had been provided. They were also indebted to Mr. Campbell and Mr. Seaborn for showing them round and explaining everything to them. It was with very much pleasure indeed that he once again met Mr. Campbell, who, he might remind some of those present, was the originator of the Association of which they were members. He well remembered Mr. Campbell's original appeal, which appeared in the Technical Press; and he (the President) was one of the dozen or so who responded, met, and helped to form the Association. Mr. Campbell had followed its fortunes from a distance with much interest, and perhaps would come and give them some of his experiences on a later occasion. The President also remarked that he would like to take this opportunity, on behalf of the Association, of sincerely thanking the "Powers that be" for the undoubted favour and active help that were accorded them in their endeavours—which was distinctly evidenced by the fact of so many being able to obtain leave of absence from duty for what was practically a whole working day. He trusted this fact would be pondered on by those present, and its significance realized, and that in return they would take full advantage of these excellent opportunities to note what was of value and a help to them in the business they had elected to follow. The day had been a most instructive one to all; and he wished to call their special attention to the value of an inspection of what—by comparison—he might term the smaller works. In such works, often on limited space or with restricted means, they might very frequently see marvels performed in the way of results which would bear close comparison with those obtained from some of the large concerns, where plant and machinery were plentiful. Such results, however, could only be secured by efficient management; and if the appearance of the works they had just inspected was a guide, the inhabitants of Luton were to be congratulated on their gas undertaking and the staff responsible for it.

The vote of thanks to the Company, Mr. Phillips, and the staff proposed by the President having been seconded by Mr. L. F. Tooth, Mr. Campbell, in response, remarked that Mr. Phillips was extremely sorry not to be able to be with them that day, and had specially asked him to say he hoped the visit to the works would be beneficial to those who formed the party. When Mr. Phillips received a letter from the Secretary (Mr. J. G. Clark) regarding the visit, he replied that, owing to a prior engagement, neither he nor his son would be able to meet them and take them round the works. Mr. Campbell then went on to say that, when he wrote his original letter to the Technical Press, and received seventeen replies, he did not think the proposal would result in the formation of an Association having such a membership as was evidenced by the number present that day. He thanked the President and Mr. Tooth for the kind remarks they had made, and trusted the visit had been an enjoyable one, and hoped the Association would go on increasing in strength and value.

At the close of the proceedings, the President again reminded the members that Saturday, May 4, was the date fixed for the *Conversazione*, and he asked them to be careful to keep themselves free so as to be present on the occasion.

Institution of Gas Engineers' Sub-Committee on Carbonization

The Secretary of the Institution (Mr. Walter T. Dunn) asks us to state that the name of Mr. Charles Carpenter, of the South Metropolitan Gas Company, has been added to the Sub-Committee appointed "to investigate and report on any methods of carbonization likely, in a noted degree, to increase the value of gaseous and residual products from coal, or in other ways to reduce costs of manufacture."

North of England Gas Managers' Association.—The sixtieth half-yearly meeting of the Association will be held in the Lecture Theatre of the North of England Institute of Mining and Mechanical Engineers, Neville Hall, Newcastle-on-Tyne, on Saturday, the 27th inst., under the presidency of Mr. T. Hardie, of Gateshead. According to the circular issued by the Hon. Secretary (Mr. Herbert Lees, of Hexham), there will be three papers: "A Further Development in Gasholder Guidance with Spiral Supports," by Mr. W. Gadd, of Manchester; "Some Notes on Capital Charges," by Mr. Herbert Lees; and "Automatic Street Lighting at Barnard Castle," by Mr. R. Wood, of Barnard Castle. The members will afterwards dine together.

Screw-Threads for Gas-Tubes.—At the 25th annual general meeting of the London Chamber of Commerce last Wednesday, the report submitted by the Council set forth that during the past year the Engineering Section discussed the question of screw-threads for gas-tubes, particularly with reference to complaints from merchants and users that the tubes of one maker, though nominally screwed to standard threads, would not fit those of another maker. A letter was addressed to a number of Chambers of Commerce and manufacturers, calling attention to the report issued by the Engineering Standards Committee in April, 1905, adopting the Whitworth as the standard screw-thread, and expressing the hope that manufacturers, sellers, and buyers would use it in all future transactions. Subsequently a letter was received from the Engineering Standards Committee, explaining that the delay which had occurred in the adoption of the standard threads by the tube trade was due to the fact that the gauges referred to in the report were not available. Some difficulties had occurred in regard to procuring suitable hardened gauges; but it was hoped that those for checking the various manufacturers' gauges throughout the country would be available at no very distant date. The report was adopted.

ECONOMIZING COAL AND UTILIZING PRODUCTS.

Problems of Applied Chemistry.

In the last number of the "JOURNAL" brief reference was made (p. 84) to a lecture on the above subject recently delivered by Professor GEORGE LUNGE at the Royal Institution. We now give other portions of the lecture bearing upon matters in which our readers are specially interested.

We, who have been born to see the ascendancy of coal as the principal producer of energy in bulk, can hardly realize what a short epoch in the past and future history of mankind belongs to the age of coal. It has taken many thousands of years to form the beds of coal which exist in the earth's crust, and which have preserved to us a tiny portion of the solar energy radiated upon our planet during that period, millions of years ago. At that period, for various reasons, the production of living matter must have been incomparably more rapid than is the case at present. During untold ages, this stored-up energy was lying idle, hidden under the accumulations of the more recent geological formations, not merely up to the advent of man, but through nearly the whole of his history. Leaving aside the tens of thousands or (according to some) hundreds of thousands of years during which man existed before the dawn of history, we must remember that historical documents exist in Egypt, Babylon, India, and elsewhere, taking us back at least 8000 years, and that the most glorious times of the Greek and Roman civilization are about 2000 years behind us. How modern, in view of these figures, is the use of the coal, and over what a short time it will extend! In these isles the use of coal is much older than in any other country. But even here its serious exploitation is comparatively recent, dating barely 150 years back; while its future (even if we disregard the more pessimistic estimates) is not likely to exceed some 200, or at most 300, years. Germany and the United States will probably hold out 200 or 300 years longer; but in all other countries the chances are all the other way.

Well, what is to happen then? Those countries where water power is abundant may possibly substitute electrical heating for that produced by the burning of coal; but what about England and Germany, which are so poorly off in this respect? Even in those countries which are more favoured, the amount of water power is by no means infinite; and, if it had to be drawn upon, not merely for motive purposes, but for the production of electricity for heating, it would be found insufficient in most places. Here we are faced by one of the greatest problems of applied science, both in chemistry and in physics—a problem which will give plenty of occupation to generations of future inventors. At present we can only surmise that some solution will present itself in the shape of a direct conversion of the sun's rays into other forms of energy; but the means by which this would be practically accomplished are at present quite uncertain.

The age of coal, in the midst of which we are living, short as it is evidently doomed to be in the long history of mankind, has been of incalculable service. For our purposes we may dismiss the earlier part of it, and look back only a hundred years. In all branches of industry, in locomotion, in the means of communication, and in innumerable matters ministering to the comforts of life, the progress since that time has been going on at a geometrical ratio. The present state of all these factors of civilization in Europe (to say nothing of America) differs from that obtaining a hundred years ago far more than the latter differed from the Roman Era, or even from the age of the Egyptian kings. And this miracle has been brought about solely by coal, without the aid of which it is simply impossible to imagine the revolution which has taken place since then. "Railways!" That single word, to give only one instance, will bring this home to anyone who ponders over the matter. And it is equally impossible for us to imagine that, during the past century, there could have been any other invention, based upon the utilization of the other supplies of energy of which we have spoken, which could have replaced the untold services of coal—that accumulator of solar energy which alone has enabled the human mind to work out the thousand-and-one channels through which modern civilized life is flowing. We may say this with all confidence, for how otherwise could we account for the fact that such inventions were not made in former times, when there were certainly as many ingenious minds in the world as during the coal-consuming age?

Let us now come down to considerations of a more modest, but more practical, nature than those in which we have just been indulging. Seeing that the stock of mineral fuel upon this earth is so very limited, cannot we find means of husbanding it more than has been done hitherto? It is only too notorious that the way in which coal is at present consumed is most wasteful. Of the energy residing in coal, most ordinary steam-engines utilize less than 10 per cent. by converting it into mechanical motion; and even the most perfect steam-engines devised utilize hardly more than 15 per cent. of it. Improvements in this direction may possibly swell this proportion a little; but there is no prospect of gaining much in this direction. Enormous wastages are also incurred in other ways. The conversion of pig iron into steel, the manufacture of glass, and many other industries, consume from four to twenty times, and even more, of the quantity of coal required by theory. Many descriptions of coal are too poor to be used at all, except in the immediate vicinity of the spot where they occur; and in burning our fuel, whether it be for industrial or for technical purposes, we invariably send its nitrogen into the atmosphere, which surely contains quite enough of that commodity—the only exception being the manufacture of coal gas, to which we shall refer later on. Here some of the grandest problems of applied chemistry present themselves to us—how to stop that fearful waste of fuel, and how to recover the nitrogen of the coal, if that be possible.

It is certain that we must look for the solution of these questions in the direction of converting coal into gaseous fuel. It is true that much has been done in that field in past years, and more especially will the name Siemens occur to every one in this connection. But much more remains to be accomplished. Another great stride ahead lies in the better utilization of the waste gases from blast-furnaces, in which respect the last few years have witnessed some very important improvements. All this refers merely to better utilization of the heating power of coal, but not to that other great task, the recovery of its nitrogen in a useful shape. This, together with the question how coal of poor quality is to be turned to a better account, has been tackled by the equally indefatigable and intelligently directed energy of Dr. Ludwig Mond, one of the benefactors of the Royal Institution. His invention—"Power Gas"—has already attained a large measure of success, as is proved by the extent of the plants erected and designed. Mond's process belongs to that class by which we approach one of the greatest problems, for the time being, of applied chemistry—I mean the conversion of nitrogen from sources not yet opened out into ammonia and nitrates.

The immense importance of this latter problem lies in the fact that it touches our most urgent want—our supply of food. The soil of most countries, if tilled in the old manner, would not nearly suffice for the production of the requisite amount of food for men and cattle; while the limits of its producing capacity are being gradually narrowed down by exhaustion. Sir William Crookes, in his address to the British Association in 1898, has most forcibly drawn attention to this. The importation of food-stuffs from other less thickly populated countries can only modify, but not altogether extinguish, the danger of ultimate shortness of food at some future date, possibly not so very remote. It is certainly a great comfort to know that, with suitable manuring, the soil may be forced to yield even better crops than it would give in the virgin state, let alone in a condition impoverished by centuries of tilling. But stable manure is nothing like sufficient to attain this object; and we must turn to mineral fertilizers, principally phosphates, potassium salts, and nitrogen compounds. The two former classes are found in abundance in Nature, and there is no danger apparently of their being exhausted during the next thousand years. But the case is very different with the mineral forms of nitrogenous manures—*i.e.*, ammonium salts and nitrates. For agricultural purposes, it does not make much difference whether we apply the nitrogen in one or the other of these forms. The ammonia, apart from insignificant quantities otherwise obtained, all comes from the nitrogen of the coal; but up to about twenty years ago only that coal which was used in the manufacture of gas was made to yield ammonia, and only one-sixth of its nitrogen was obtained in this form. In all other uses of coal, where at least twenty times as much is consumed as in the manufacture of gas, the nitrogen was simply sent into the air.

Quite recently, some progress has been made in the way of utilizing some of this nitrogen as well. I have already mentioned the Mond process, where some of the nitrogen is recovered in the shape of ammonia; but this covers only one corner of the field. In another section a good deal has been already achieved. In the manufacture of coke, which is also a process of destructive distillation, and entirely analogous to gas making, very much larger quantities of coal are consumed than for the latter, since coke is indispensable for the smelting of iron and for other metallurgical purposes. Up to about twenty years ago, all the volatile bye-products in the manufacture of coke were lost—that is to say, tar, gas, and ammonia. The recovery of these bye-products was first carried through in one or two French coke-works about 1861, but nowhere else for a number of years, though in 1879 the late Dr. R. Angus Smith had earnestly recommended to the English coke-works the adoption of the system. Even now, both in France and England, as well as in America, the recovery coke-ovens have found only very limited adoption. In England, perhaps 5 per cent. of the coke is made in this way, against upwards of 50 per cent in Germany. In consequence of this, while twenty years ago Germany imported from this country nearly all the ammonium sulphate required for agriculture, she now imports none, and has, on the contrary, become a large exporter of that commodity. The reasons for this wonderful change are various. One of them is undoubtedly the revival of that spirit of push and enterprise which, after lying dormant for centuries in consequence of the Thirty Years' War, caught up the German people, and enlivened German industry in all directions. Without going into details on this matter, we may take it that a considerable reserve of ammoniacal nitrogen exists in the quarter indicated, and that the present production of about half-a-million tons of ammonium sulphate might be greatly increased in that manner.

But that reserve is, after all, nothing like sufficient to cover the requirements of agriculture in the future; and it is quite likely that in the long run all the really available nitrogen of the coal would not suffice for the wants of man. And what about the time when coal itself will be exhausted? Well, there is an eternal and inexhaustible source of nitrogen to which we must turn, and that is the atmospheric air. Four-fifths of this consists of nitrogen,

calculated to amount to 4000 billions of tons, mixed with a quarter of that weight of oxygen. More than 100 years ago—in 1785—Cavendish discovered the fundamental fact that, by the action of the electric arc, the nitrogen of the air combines with oxygen to form nitric acid. The formation of ammonia from atmospheric nitrogen has also been effected, both by electricity and (which is more important still) in other ways as well. But until a very few years ago these facts had never been put to any practical use; and the problem of turning the atmospheric nitrogen into ammonia or nitric acid, although frequently approached in a purely scientific, or experimentally in a technical way, had not been solved. Our days have seen the realization of this most important task.

Let us first speak of ammonia. We are led up to this by what is verily a long and circuitous path. We must start from the discovery of calcium carbide (announced in 1862 by the celebrated Woehler), the technical preparation of which substance was first effected by Willson in 1892, and about the same time by Moissan. True, the expectations that were entertained in various quarters in connection with this remarkable chemical product have not been fully realized to the extent anticipated by the inventors. But, on the other hand, an entirely novel use has been discovered for it by Professor Adolf Frank and Dr. Caro, of Berlin. They found that when nitrogen is passed over red-hot calcium carbide, it is absorbed with formation of calcium cyanamide. This latter, when treated with water under high pressure, is made to yield ammonia. But it is not necessary to do this, since the crude product, which they have called "lime-nitrogen," can serve directly as a nitrogenous fertilizer, and is in this respect equivalent to its own weight of ammonium sulphate. This is, indeed, its principal use for the present and the near future; but, as a matter of fact, the discoverers go much farther. From the lime-nitrogen they prepare cyanogen derivatives of various kinds, some of which are valuable as constituents of explosives; and they are earnestly trying to employ it in the manufacture of nitric acid. They have also brought in several other industries—the manufacture of pure graphite, of pure hydrogen, of urea, and so forth. . . . The works already in operation, or in course of construction, will by the end of this year utilize water power to the extent of some 55,000 H.P., and will produce lime-nitrogen equivalent to 100,000 tons of nitrate of soda, and this with an expenditure of force less than one-third of that required for the process of Birkeland and Eyde, of which I shall speak directly. I must, however, first of all say a word about the strenuous efforts made by Professor Frank and Dr. Caro, this time in connection with Dr. Ludwig Mond, to extract from peat both power and ammonia. Enormous, but hitherto almost worthless, deposits of peat exist in Ireland and North Germany; and the ultimate success of these endeavours, which we have every reason to hope for, will prove an incalculable boon to these countries. At the same time, all fears of a scarcity of ammonia for agricultural purposes would be thus removed for generations to come.

Important as ammonia is as a fertilizer, it ranks after the nitrates in this respect; and, unlike ammonia, the nitrogen of the nitrates is of immense importance for other purposes as well—viz., the manufacture of nitric acid and of explosives. The very limited quantities of nitrates required in former times, amounting to a few tens of thousands of tons per annum, were furnished by Indian saltpetre—that is, crude potassium nitrate. A far more abundant supply was opened out a little more than half-a-century ago, when the exploitation of the beds of nitrate of soda in South America was begun. The crude nitrate found there is refined on the spot, and comes to us as Chilian saltpetre, which is almost pure sodium nitrate, to the tune of 1½ million tons per annum. About four-fifths of this is taken up by agriculture, the remainder serving, in the first place, for the preparation of nitric acid. As for that acid, it is impossible to imagine how we could do without it. Apart from minor, but quite indispensable, uses, one of which is in the manufacture of sulphuric acid by the lead-chamber process, the greater part of nitric acid is consumed in the manufacture of coal-tar colours and of explosives.

After many unsuccessful attempts at realizing for practical purposes the discovery of Cavendish, and a thorough investigation of its scientific principles by Lord Rayleigh, Muthmann and Hofer, Nernst, Haber, and others, this has been achieved; and once more, by means of that well-nigh omnipotent agent, electricity, which thus renders yet another service to mankind. At Notodden, in the Norwegian Hitterdal, a factory has been established to carry out the process of Birkeland and Eyde, who, by an ingenious application of the extreme heat produced by the electric current, make the nitrogen and oxygen of air combine to nitric oxide, which at a lower temperature is spontaneously oxidized into nitrous vapours, with the ultimate production of nitrites or nitrates. This time there is really no doubt that a practicable and economical process has been discovered for which it is intended to employ, by the end of this year, water power to the extent of about 30,000 H.P. The Notodden process bids fair to be followed by other even more efficient processes. The most important of these is that of the Badische Anilin-und-Soda-Fabrik, for which an experimental factory is in course of construction, and for which 50,000 H.P. are to be employed. But for some time to come Chilian saltpetre will rule the trade.

Confusion is sometimes made between energy and the creation of high temperatures. This can be very well illustrated by the use recently made of finely-powdered aluminium, both as a component of explosives and as an agent for producing very high temperatures, in the shape of Dr. Goldschmidt's "Thermite." In both cases the fact is utilized that aluminium is easily, and in the shape of fine powder, almost instantaneously, converted into its oxide—alumina—by substances capable of giving off oxygen. In the case of thermite, a mixture of finely-powdered aluminium and ferric oxide is, when lighted, decomposed instantaneously into molten iron and aluminium oxide. The heat produced thereby far exceeds that produced by coal in any conceivable way; it is equal to that of the electric arc. One of the most important applications of this agent occurs in the welding of the ends of railway rails, when already laid down, into one continuous rail of any length required. And yet the total energy of thermite is only 450 B.Th.U. per kilogramme, or, in other words, about 1-20th of that of the best coal. But whereas it takes a good deal of time to burn 1 lb. of coal, during which process there is a great loss of heat by radiation, and the heat is spread over a current of gases which we call the "flame," 1 lb. of thermite burns off in about a second; and, as there are no gaseous products formed, all the heat generated remains within the molten iron and alumina, which accounts for the extreme degree of heat to which these are brought.

The limits of my time have been too nearly reached for me to discourse upon many other problems which present themselves in inorganic applied chemistry, and only a few minutes are left to speak of those belonging to the domain of organic chemistry. I will point to only two problems of this kind, one of them being the substitution of artificial for natural colouring matters. This, indeed, has now been carried out almost to the bitter end. Long ago, one of the oldest and most widely-used colouring matters—that contained in madder—succumbed to the attacks of the chemists, among whom the names of Edward Schunck and William Henry Perkin testify to the glorious share taken by Englishmen in that victory. The colouring substance of madder—alizarine—is now made from English coal tar, and has altogether taken the place of the impure form in which it occurs in the madder plant. The growers of this plant in the South of France and elsewhere have had to abandon its culture altogether, to their great sorrow. A similar fate has already partly overtaken, and may, in the end, destroy entirely, the culture of indigo, most of which comes from British India, and formerly represented a value of £4,000,000 per annum. Another circumstance which at that time militated against artificial indigo was this—that it started from toluene, the total available quantity of which substance would not have sufficed for producing anything like all the indigo required, even if none were used for other purposes, which is out of the question. But this state of matters has changed. Twelve years ago, the late Carl Heumann, Assistant Professor in my laboratory at Zurich, discovered the synthesis of indigotine from naphthalene. This, like toluene, we get from coal-tar, but in about ten times the quantity; so that there is no fear of any scarcity of naphthalene being experienced even in the future. The late Dr. Rudolph Knietsch, at the Badische Anilin-und-Soda-Fabrik, gradually transformed Heumann's laboratory process into a factory process, which is working with entire success on a large scale. Synthetic indigotine is now manufactured at such a low price that its competition has proved a severe blow to the indigo-planting interests. Thus the triumph of scientific investigation and practical skill in chemical manufacture, gratifying though it may be as a splendid achievement of applied chemistry, is a sad trial to many thousands of Indian ryots and their British masters; and this is merely the foretaste of what will inevitably happen in many other cases.

In bringing his interesting and instructive discourse to a close, Professor Lunge said he should have liked to touch upon what was perhaps the very greatest problem of applied chemistry—viz., the direct production of feeding-stuffs for man and beast; but this was too vast a subject to be discussed at the end of a lecture.

Electrical Exhibition at Manchester.—The National Electrical Manufacturers' Association have passed a resolution expressing the opinion that it is undesirable to hold an exhibition in Manchester before the autumn of 1909. The subject was referred to in a paragraph in last week's issue.

Eastern Counties Gas Managers' Association.—As previously announced in the "JOURNAL," the spring meeting of the Association will be held in Lincoln on Thursday. We learn from the programme issued by the Hon. Secretary and Treasurer (Mr. T. A. Guyatt, of Ely) that, by invitation of the Chairman of the Gas Committee of the Corporation (Alderman Wallis, J.P.), the members will be entertained at luncheon at the Great Northern Hotel; and at two o'clock they will be conveyed to the Bracebridge Gas-Works, which will be inspected. The business meeting will be held in the Guildhall, when the President (Mr. E. J. Brockway, of Cleethorpes) will take the chair at three o'clock, and the members will be welcomed by the Right Worshipful the Mayor of Lincoln (Colonel J. S. Ruston, J.P.). The items on the *agenda* comprise the presentation of the Committee's report and accounts for the past year, the election of new members and the officers for the ensuing year, and the reading of two papers—one by Mr. J. Davis, of Gravesend, on "The Manufacture of Carburetted Water Gas;" and the other by Mr. W. H. Mainwaring, of Lincoln, on "The Lincoln Gas Undertaking: Twenty Years of Municipal Control." At the close of the meeting, the members will dine together.

DISCHARGING COKE FROM VERTICAL RETORTS.

In the "JOURNAL" for the 8th of January last (p. 90), was described and illustrated a device patented by the Compagnie pour la Fabrication des Compteurs, &c., of Paris, for discharging coke mechanically from vertical retorts. The Company have since modified the slide, which was one of the principal features of the original patent, in the manner shown below.

Fig. 1.

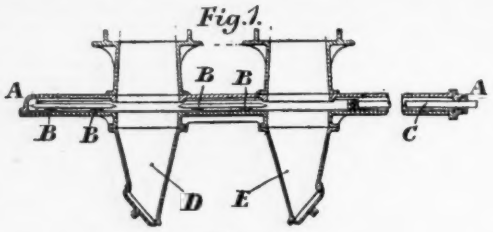
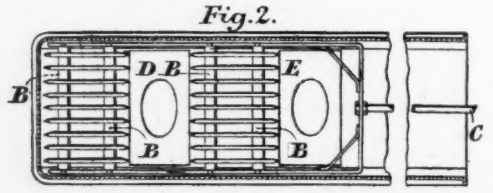


Fig. 2.



The part of the appliance which separates the coke into horizontal layers consists of a grating, formed of pointed bars having a space between them, which takes the place of the slide described in the original specification. In the above illustrations, fig. 1 is a section through the axis of two vertical retorts; and fig. 2 a horizontal section on the line A A of fig. 1. The grate-bars shown in fig. 2 are held firmly together by the two irons B, attached to other irons forming a frame, which is worked by the rod C. The two gratings, as will be seen, have between them a space equal to the lower section of the retorts. The action of this piece of mechanism is the same as that of the slide described in the former patent. It should be pointed out that the gratings may be arranged to act either conjointly or independently. In the modified arrangement, the hoppers D E are closed by self-sealing retort-lids, so as to ensure gas-tightness.

EXAMPLES OF SCHOOLROOM LIGHTING.

At the last Annual Meeting of the New England Association of Gas Engineers, Mr. N. W. GIFFORD, the General Manager and Superintendent of the East Boston (Mass.) Gas Company, who is the Secretary of the Association, read the following short paper on the above subject.

The schoolrooms in question are finished in cherry or mahogany coloured wood, and have white ceilings and walls, except where the latter are occupied by blackboards. Two rooms (Nos. 12 and 22) are alike in size and arrangement of desks—44 desks in each. In all cases the ceilings are about 15 feet high from the floor. Room No. 12 is lit by four clusters of four 16-candle power electric lamps, about 4 feet from the ceiling, and five 16-candle power lamps on wall brackets. The clusters have opal dome shades placed under them, with the open side up. The wall lights are clear bulbs with clear bell-shaped shades. The effect is a very soft and uniform light, but rather dim, and with faint shadows. Room No. 22 has four harp fittings, with a single upright mantle burner and side-pilot bye-pass. These fittings are placed in the same relative positions as the clusters in the electric lighted room below. The dome shades on them are turned upside down, so that no direct light from the mantle strikes the desks; but, as from the electric clusters, part passes through the opal shade, and part is reflected to the ceiling, and from there to the desks and walls. The general effect is a soft white light, evenly distributed; the shadows being very faint. There is no glare on the walls, and no bright light strikes the eye when looking in any direction.

Two other rooms (Nos. 17 and 27) are of the same size, but have only 36 desks each. Room No. 17 was lit with four clusters of four 16-candle power lamps, with opal reflector above, and five 16-candle power side lights. In this case the light was fairly evenly distributed, and sufficient in quantity; but the cross shadows were annoying, and the bright lamp filaments met the eye from some point whenever it was raised to the height of the wall lights or the cluster. This room was afterwards fitted up with three Nernst lamps (the fourth, for some reason, not being in place at the time of the comparison), on the same outlets as had supplied the clusters. The lamps were placed with the glowers uppermost; and in this position the direct light did not strike the eye so objectionably as it might have otherwise done. The light on the desks was considerably stronger than in the other rooms, and was fairly well diffused. In the adjoining room there was an installation of enclosed arc 4-ampere lamps, with flat corrugated tin reflectors above and lily-shaped opal shades below, with the open end up. This gave a very good light, pretty well diffused; and the light sources were not objectionably bright.

In another room, two mercury vapour lamps were placed in the front of the room close to the ceiling. The effect of the light on colours and the complexion was ghastly. The back rows of the desks received very much less light than the front ones. The shadows were quite sharp; but, being all in one direction, they could be avoided. At first, the light seemed painful; but after a week's working with it one became accustomed to the weird appearance, and did not notice any ill-effects. The lamps were too bright to look at with comfort; but, being so high, they could be avoided. Another room was fitted with six "Gem" lamps with glass shades, which gave a strong light on the desks, but had the objection of presenting bright sources of light.

In the following table, an attempt is made to show some comparison between the various lightings:—

	Brightness of Light.	Light on Desks. Candle-Feet.	Energy Used per Hour.	Cost per Hour. Cents.
4 gas-mantles*	10·9	1·70	20 cub. ft.	2·00
21 16-c.p. lamps*	11·5	1½ to 1	1040 watts	10·40
21 16-c.p. lamps†	13·9	1·75	1040 ,,	10·40
4 Nernst lamps	13·0	2 +	1408 ,,	14·08
4 arc lamps	12·0	1·7	1792 ,,	17·92
2 mercury lamps	15·0	4 to ¾	550 ,,	5·50
6 "Gem" lamps	—	3	750 ,,	7·50

* Inverted shades. † Shades above.

The figures of initial brilliancy were obtained by looking at the lights through a simplex photometer, and are the readings observed on the scale. They show the differences in terms of which the values are not known to the writer. They do, however, show that the bare 16-candle power lamp clusters, which gave about the same amount of light on the desks as the gas-mantles, were very much brighter when looked at directly. Of course, the cry is immediately raised that the gas robs the air of its oxygen.

The requirements of schoolroom ventilation demand 50 cubic feet of air per minute for each pupil. As 30 cubic feet are said to be necessary, there is a margin of 20 cubic feet per minute. In the above case, the air robbed of its oxygen by the burning gas would be 2 cubic feet per minute, or one-fourth of 1 per cent. of the surplus air in rooms of this size.

The paper gave rise to a short discussion, in the course of which Mr. Addicks pointed out that the author had not drawn any conclusions, and said he should like to ask him if he considered the illumination better with the incandescent mantle than with any other kind of lighting. Mr. Gifford replied that, so far as he knew, the Boston ideal was indirect lighting—the light being reflected on to the ceiling, and a little of it filtered through an opal shade—which certainly produced a very soft light, and was a relief from the condition of having a bright light in front of the eyes and a dim one on the work. Trouble arose from working under a dim light, and then raising the eyes and having them flooded with light which was much stronger than that to which they had been accustomed. In answer to a question as to the meaning of the word "Brightness" in the heading to the first column of figures, Mr. Gifford said the terms in which the brightness was stated were of unknown value to him. The photometer consisted merely of a glass scale of varying sections of opaqueness; and in use the source of light was looked at through a hole across which the scale was drawn. On reaching a point where the light was blotted out to a certain extent, a reading was taken. He found that on looking twice at the same light he obtained the same reading.

MECHANICAL TAR SPRAYING FOR ROADS.

The application of tar for the improvement and preservation of road surfaces is a question that has not long been with us; but it soon became manifest, on experience, that, in the cost of such application, labour formed a formidable item. It was quite in the natural order of things, therefore, in these times of ingenuity in devising means of saving labour and producing economy in gaining desired ends and effects, that those interested should seek to develop appliances for accomplishing the work mechanically, so that the value of tar for road surfacing should not be restricted by excessive labour costs. We have noticed various machines that have been designed for the purpose; and now, at the stand of Tarspra Limited at the Building Trades Exhibition (which is noticed elsewhere), some particulars were gathered as to what the system that is being exploited by the Company is able to do in effecting economy.

The Company have three standard types of vehicles—each provided with all necessary patented appliances for dealing with the spraying of tar at any temperature: No. 1 is a 1000-gallon combined Thornycroft steam motor, complete with patented steam-heating apparatus, gauges, sprays, &c.; No. 2 is a similar arrangement, but with steam traction; and No. 3 is a 200-gallon tank on a two-wheeled cart, for either horse or steam power. The tar is applied through tar-atomizing nozzles, at a pressure of 200 lbs. to

250 lbs.; and a result of this method of applying the tar is that it immediately penetrates well into the surface of the road. It is not a mere superficial coating that is given; but, as was proved by experiments at Birmingham, the tar sinks quite 2 inches into the surface of the road. This, to all intents and purposes, converts an ordinary macadamized road into a tar macadamized one.

All are aware of, and agreed as to, the benefits arising from the treatment of roads with tar; and so, in considering the subject of the mechanical application of the tar, the questions to be weighed are those of efficiency, expedition, and cost. The penetration of the tar applied in this manner, the testimony of eye-witnesses that the tar so sprayed is rapidly absorbed, and the testimony of the Engineer to the Beckenham District Council (Mr. John A. Angell) that a road surface treated by this system remains "hard, firm, and undisturbed by traffic," all point to efficiency; and contributory evidence of efficiency is found combined with the question of expedition. The results of experiments made with the machine in different districts are now available; and though the trials were carried out in different parts of the country, they corroborate one another. In the autumn of last year, some 1200 square yards of road in Beckenham were treated by one of the carts; the number of men engaged being two, and the time occupied ten minutes. By hand labour, four men would have been employed nearly a whole day over the work; and there would not have been by hand labour the uniformity of spread that was obtained by spraying. Another result is the economy of tar that ensues; the quantity required to dress the above mentioned road area being only about 80 gallons in all. Beckenham, through which numerous motor cars and cycles pass daily to favourite rural haunts, had had experience of tar road-coating by hand during the preceding summer—some 4¼ miles having been dealt with. The work occupied 32 working days of ten hours each; but, owing to intermittent work through wet weather, the number of days mentioned extended over some eight weeks. Two coatings on the 4¼ miles of roadway then cost £250; but seeing that the time occupied would, it is computed, have sufficed for covering 70 miles of roadway by a Tarspra machine, it is estimated that the 4¼ miles could have been dealt with mechanically at a cost of £125. It is calculated, in fact, that the whole of the roads of Beckenham—48 miles in extent—could be twice coated by this pressure-spraying system in 20 working days of ten hours each. That is the opinion of the District Engineer. The Tarspra Company, however, on their extended experience, calculate that it is possible to work (single coating) at the rate of a mile an hour, covering an area of 7½ to 8 feet wide. Two coatings are, in most cases—not all—preferable the first year; and thereafter a single one annually will suffice. Anyone who looks into this question of cost, and applies it to his own conditions, may take it that, whereas the cost of tar surfacing by hand labour has hitherto been from £70 to £90 per mile of road six yards wide, it can now be done (two coats) by mechanical spraying at rather less than half the cost.

During the past ten days, there have been a couple of experiments at Maidstone with the Thornycroft motor-waggon type of machine; the tank having a capacity of 750 gallons. Ordinary gas tar was used, heated by the Company's patented process as the steam motor was propelled over the road, and applied through the atomizing nozzles at a pressure of in one case 250 lbs., and in the other 200 lbs. In one of the trials two men were employed on the machine; and half a mile of the London main road on one side (13 feet) was sprayed in fifteen minutes. The Borough Surveyor (Mr. F. Bunting) and the County Surveyor (Mr. H. P. Maybury) were present, and expressed approval of the efficiency with which the machine worked. Experiments with handwork in Maidstone last summer cost 1⅜d. per square yard; but it is stated that the Company are prepared to spray any length of road at the rate of ¾d. per square yard. The spraying of the county and borough roads of Kent would cost about £30 per mile, half of which in the case of the borough roads would be borne by the County Council. Some idea of the economy that is to be effected is gathered from the fact that last year the Kent County Council spent not far short of £5000 in tarring road surfaces by hand, and only 53 miles of roads were covered. The cost would only have been about £1600 by mechanical spraying. The large abatement in expense that is thus promised by mechanically doing the work, *plus* the enhanced efficiency, must tend to greatly popularize the employment of tar for this purpose.

Last Friday afternoon, through the kindness of Mr. A. R. Finch, the Borough Engineer of Kensington, there was a demonstration in the Elsham Road in that borough; and it may interest readers who are within easy distance, to know that next Friday afternoon at 5 o'clock it is proposed to repeat the proof then given of the effectiveness of this tar road-surfacing system.

The Venturi Meter as a Gas Measurer.—The "Proceedings" of the American Society of Mechanical Engineers for March contains an article by Mr. Charles E. Lucke giving the results of measuring gas by the Venturi meter, with which many of our readers are familiar as an appliance for measuring and recording large quantities of water. The size used by Mr. Lucke was a 16-inch, and the measurements obtained led him to the conclusion that this meter was most accurate; and he recommended it to all who have large quantities of gas to measure, even when the pressure fluctuates as violently as it may with a number of gas-engines running in parallel on a pipe.

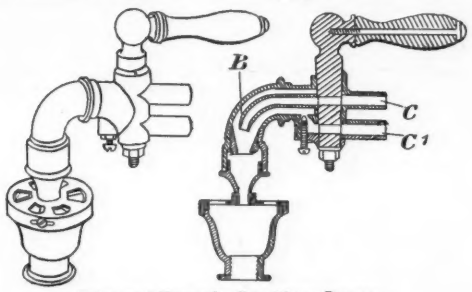
REGISTER OF PATENTS.

Gas-Stove Burner.

PRICE, H. A., and TURNER, H. C., of Camberwell.

No. 25,358 of 1905. Post dated (by order), March 15, 1906.

This arrangement (as shown) consists of an attachment that can be fitted with any ordinary bunsen burner, so that it can be used either with a separate air blast, or as an ordinary atmospheric or bunsen burner. The attachment comprises a cock with two inlets (for air blast and gas respectively) and one outlet, so arranged that the air and gas are combined in the outlet; and the plug of the cock is so drilled



Price and Turner's Gas-Stove Burner.

that, by a single movement of the lever handle, the air and gas are simultaneously regulated, and perfect combustion obtained. The supply of air may also be regulated in the usual way by an air-bell fitted with a regulating shutter, with perforations corresponding with similar perforations in the body of the air-bell; while the volume of gas is regulated by a set-screw. By cutting off the air blast and opening the regulating shutter, the burner can be used as an ordinary atmospheric burner.

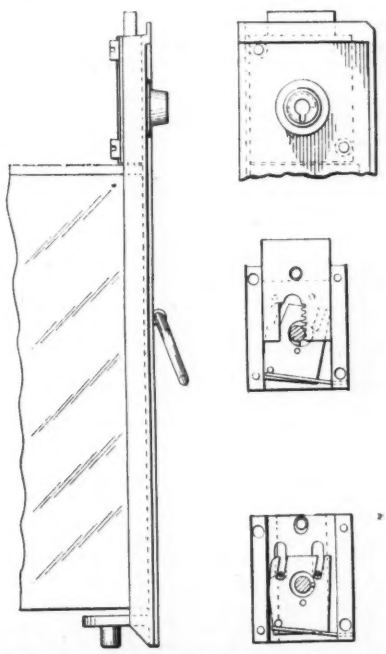
B is the outlet and C the inlet for air; while C^1 is the inlet for the gas.

Money-Boxes for Coin-Freed Meters.

PARKINSON, W. C., of Cottage Lane, E.C.

No. 6398; March 16, 1906.

The patentee proposes to provide the cash-boxes of coin-freed meters with a specially constructed internal lock fitted in the cash drawer and operated by a key, so that the drawer is flush and the lock not exposed, and so that the key cannot be withdrawn unless the bolt is shot.



Parkinson's Money-Box for Coin-Freed Meters.

As shown, the lock-bolt is provided with a rack adapted to engage a pinion on the key. On the insertion of the key, an extension on one or more of the teeth of the pinion serves to operate a double lever provided with open-ended slots engaging with pins on the lock-bolt. When the pins pass out of the slots, the bolt is locked, and the lock is removed by the key. When unlocking, the end of the key-shaft extends through the double lever, and also through the lock casing, and engages a spring-catch—pushing it out of engagement with the lock-bolt. The key is then turned, operating the double lever and withdrawing the lock-bolt, when the cash-box can be removed.

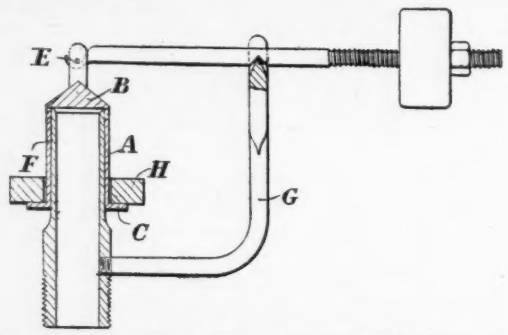
In order to prevent the withdrawal of the key except when the cash-box is locked, a projection of the key engages in a recess formed in the key-guide or escutcheon, having an admission opening and a stop.

Relief Valves for Intensified Combustion Plants.

ROESSLER, A. C., of Wandsworth Common, and the AIR-LIGHT COMPANY, LIMITED, of Victoria Street, S.W.

No. 6793; March 21, 1906.

This invention relates to means used for maintaining the efficiency of a number of burners working with gas and air supplied under pressure by separate conduits. The pressure regulating devices formerly used comprised liquid sealed bells which, rising on a decreased demand, operated valves for throttling the air supply or permitting an escape of air; but such liquid sealed bells "are not applicable in every situation, and there are many objections to their use." The object of this invention therefore is to "avoid the drawbacks consequent on the use of liquid sealed bells, and to provide a sensitive governor in the form of a dry relief valve."



Roessler's Balanced Relief Valves for Intensified Gas Systems.

The accompanying illustration shows one form of relief valve suggested. In the following description, it is to be understood that the lamps are all supplied with means for determining the proportions of gas and air, and that for the efficient working of these means it is necessary that the air and gas circuits should always be maintained at the same relative pressure. Thus the adjusting nipple at the burner determines for given pressure of gas and air the relative proportions of each; while a relief valve or governor as described operates to maintain the relative pressures constant—whereby efficiency of operation is maintained under all loads on the compressor.

The valve is made in the form of a tube or liner A, provided with a cap B, and a flange C at its lower end. Into the cap there are screwed two studs, which support a bridgepiece E, by which the valve is suspended over a short length of tube F, adapted to be screwed into the air-mains (not shown). This short length of tube carries an arm G, provided at its upper end with a knife edge, on which rests the lever by which the valve is suspended. This lever is provided with a screw, for some considerable distance along its length on the side of the fulcrum remote from the end at which the valve is suspended; and on this threaded portion there is screwed a balance-weight, which may be fixed in any position along the length of the lever by means of a lock nut.

The operation is as follows: Balance weights are placed on the flange C until the desired pressure is maintained; the balance weights on the lever being adjusted so that equilibrium is just maintained at this point. Any slight increase above the normal pressure immediately causes the valve A to rise, when the surplus air in the case in which the valve is in the form of a liner escapes through perforations at the head of the valve beneath the cap.

Incandescent Gas-Lamps.

ROESSLER, A. C., of Wandsworth Common, and the AIR-LIGHT COMPANY, LIMITED, of Victoria Street, S.W.

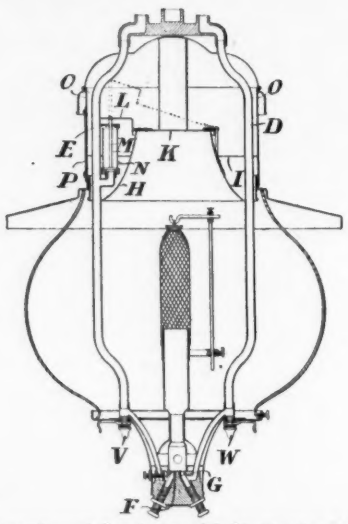
No. 6795; March 21, 1906.

This invention relates to intensified gas-lamps which "shall effectually prevent deterioration of the lighting efficiency owing to the ingress of dirt or dust." The globe chamber is completely isolated from the surrounding atmosphere while the lamp is not in use; an outlet for the combustion products being automatically provided when the air pressure is turned on, and automatically closed when it is turned off. The lamp is also provided with means whereby, in the event of the air pressure circuit failing, it may be used as an ordinary incandescent lamp.

In the lamp shown, gas and air are led by separate pipes D E to the base of the lamp, where a nipple is provided having controlled passages F G, through which the gas and air pass to the burner mixing-tube—being preferably made to impinge in jets inclined to one another, "so as to effect a more perfect mixing." Over the incandescent mantle there is a funnel H, between which and the lamp casing there is a baffle I, which makes an air-tight joint between the globe and the case, and so effectually prevents ingress of air from the surrounding atmosphere through the space between the funnel and the globe.

Normally when the lamp is not in use the upper end of the funnel is closed by a cover K, to which is attached a lever L, operatively connected to a piston M. This piston works in a cylinder N freely communicating with the air-supply pipe. Thus when the air pressure is turned on the piston rises, opening the cover on the top of the funnel, and thus providing a means of egress for the products of combustion from the lamp. After passing through this opening, the products of combustion reach the surrounding atmosphere through perforations O in the upper lamp case. A sliding door P is provided in the upper lamp case for the purpose of facilitating access to the motor cylinder which raises the cover on the funnel.

There is preferably provided at the nipple in the lower part of the lamp a free outlet for the air to the space outside the mixing-tube; the supply of air being regulated by an adjusting screw, so that only the amount of air which is required to support combustion is allowed to pass. This additional air preferably passes out through a perforated plate, which acts as a spreader; and the burner-tube may be constructed (in the manner of a bunsen burner) so that some of this additional air is drawn in through the usual bunsen holes. The remainder of the additional air passes out in the lamp globe through another perforated plate arranged above the bunsen burner.



Roessler's Incandescent Gas-Lamp with Air Supply under Pressure.

The lamp-base A is preferably suspended from the gas and air pipes D and E, and the globe-holder is pressed against the under side of the flange of the base by means of spring clips T U attached to the gas and air pipes. By this means ingress of air at the lower end of the globe is prevented.

There are additional clips V W on the gas and air pipes, whereby air from the surrounding atmosphere may (at will) enter the lower end of the globe through the space between the lamp-base and globe-holder, and the products of combustion may pass out at the upper side of the globe, which, in its lower position, leaves an open space for this purpose. In this way, in the event of the compressed air supply failing, the lamp may be used as an ordinary incandescent gas-lamp.

Manufacturing Carbonic Acid, Hydrogen, and Nitrogen.

ELWORTHY, E. G., of St. Albans.

No. 10,581; May 5, 1906.

This invention consists principally in improvements in patent No. 25,007 of 1897, in which was described a process of manufacturing water gas in special furnaces—the water gas being then forced by a blower through a second set of furnaces containing metallic oxide (preferably copper oxide) in a more or less finely divided state, or mixed with, or closely adherent upon, the surface of porous refractory and inert material; the whole being maintained at a suitable temperature by heat evolved by the reactions taking place in the furnace. On coming in contact with the metallic oxide, the hydrogen contained in the water gas is burned to steam or water vapour and is thus lost, and the carbon monoxide is converted into carbonic acid; while the carbonic acid contained in the original water gas passes through the furnaces unchanged and mixes with that produced by the combustion of the carbon monoxide. In this process, the whole of the hydrogen in the water gas—say from 50 to 75 per cent. of its volume, according to the mode of working the furnaces, was entirely wasted; being burned to water in the metallic oxide furnace. The purpose of the present invention is to "prevent such loss" thereby securing "great economy in working."

To carry out this improved process, water gas is taken as made by any of the ordinary commercial processes, or, according to the 1897 patent (and for the purpose of this invention water gas may be defined as any gas made by passing steam through or over incandescent carbonaceous material, whether such material be heated by the combustion of part of itself as in the ordinary way, or whether it be heated in retorts or ovens, or by passing a current of electricity through a mass of carbonaceous material, or by passing a current of mixed carbonaceous or hydrocarbon gas and steam over highly heated inert surfaces, in a hot blast stove, for instance), and, preferably after cooling, the hydrogen is separated from the two oxides of carbon by means of a centrifugal separator. This operation, owing to the great difference in the specific gravities of the gases, is easily accomplished. The hydrogen so separated may be used for any commercial purposes; being further purified, if required, by the removal of the traces of carbon monoxide and carbon dioxide contained therein by any suitable means—as, for instance, washing with cuprous chloride solution to remove the monoxide, and by caustic alkali or moist quicklime to remove the dioxide. The hydrogen may, however, be used in suitable gas-engines, either alone or after carburetting; and the power so generated may be employed for the carrying on of the process of manufacturing the carbonic acid by this invention.

The mixture of carbon monoxide and carbon dioxide left after the separation of the greater proportion of hydrogen, and containing also a small percentage of nitrogen, is then blown through furnaces like those described in the 1897 patent. The furnaces are preferably filled with copper oxide in a more or less finely divided state, and mixed with small pieces of inert refractory material, such as broken fire-brick or pumice stone, or inert material coated with copper oxide may be employed. The furnace having been heated to a suitable working temperature to initiate the reaction, the hydrogen contained in the gas is

burned to water vapour and the carbon monoxide to carbon dioxide—any carbon dioxide contained in the original gas, as well as the nitrogen, passing through unchanged. When the copper oxide has been wholly or partially reduced to the metallic state, and the gases cease to be completely oxidized, the current of gas is stopped or diverted to another similar furnace, while the copper is again converted to oxide by passing a current of air through the furnace, after which it is again ready for working; and so on alternately for an indefinite period.

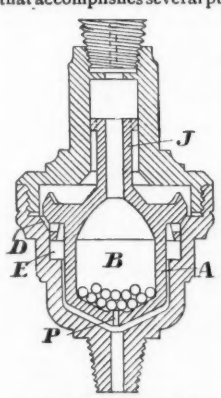
In concluding the specification, the patentee says she is aware that it has been already proposed to separate hydrogen from carbonic acid by subjecting water gas to diffusion through a mechanical gas-separator, for removing the hydrogen, and to pass the remaining portion of the gas containing a proportion of hydrogen over heated copper oxides for the combustion of the remaining hydrogen and of the carbon monoxide, and she makes no claim to such process, or to the well-known method of gas diffusion through a porous partition.

Automatically Lighting Street-Lamps.

GOZZARD, A., of Heeley, Sheffield.

No. 13,434; June 12, 1906.

This "improved burner" is so formed that the gas having passed through the lower end it acts directly on an inside valve, "of a shape that accomplishes several purposes." (1) It acts as a governor for regulating the supply of gas to the jet; (2) as a medium for supplying gas to a sentinel jet; (3) its construction renders it "easy of access for inspection and cleaning, and also allows of adjustment (balancing) without opening or exposing the internal parts."



Gozzard's Automatic Lamp Burner.

The valve A is of irregular cylindrical form, constructed with a chamber B, which serves as a receptacle for shot or other form of weights for balancing, and likewise as a reservoir and thoroughfare for the gas which supplies the pilot-light. The seat D of the valve is formed in the burner at its maximum diameter; and below the seat is a deep recess E, into which a corresponding ring on the underside of the valve fits, and which acts as a guide. Between this ring and the body of the valve is a recess pierced with a number of holes, which serve for the passage of gas from the under to the upper side of the valve as soon as it is raised from its seat. The upper part of the valve is provided with stops to regulate its lift, and has also a tubular column J rising from the centre of the cavity of the valve into the cover of the burner, so as to leave an annular space—for the passage of the gas to the jet. This column is provided with projections, which likewise form guides to steady the valve. Gas for the pilot-light, when the valve is closed, is admitted through a hole P in the bottom, and thence through the hollow column to the nozzle.

APPLICATIONS FOR LETTERS PATENT.

7660.—FENBY, E. B., "Water and like meters." April 2.
7665.—CRAIG, A., "Making air gas." April 2.
7805.—LORIN, E., "Gas-generators." April 3.
7812.—MORRIS, D. J., "Acetylene generators." April 3.
7826.—FURCH, A., "Unions for gas." April 3.
7841.—GEBR. KÖRTING AKT. GES., "Water-jet condensers." April 3.
7845.—BRÜNER, H., "Gas-producers." April 4.
7849.—OWEN, J. H., "Liquid meters." April 4.
7864.—DIGBY, W. P., and BIGGS, C. W. V., "Electro-thermal calorimeter." April 4.
7871.—GILL, G. M., and M'PHEE, N., "Rake for retort-house drawing-machines." April 4.
7881.—KIESOW, R. E. J., "Gas-regulating nipples for incandescent burners." A communication from Bünte and Remmler. April 4.
7932.—GROSSMANN, J., "Treatment of effluents from ammonia stills." April 5.
8025.—LJUNGSTRÖM, B., "Gas-turbines." April 5.
8029.—MASSEY, I., and SPENDER, A. E., "Heat-accelerator for use on gas-stoves." April 6.
8066.—KEOUGH, M. J., "Gas-retorts." April 6.

Metropolitan Water Board and Assessments in the City.—The annual report of the Assessment Committee of the City of London was presented at a meeting of the City Board of Guardians last Tuesday. It showed that the totals of the valuation lists, inclusive of alterations made by provisional lists in force on the 6th inst., were: Gross, £6,581,144 (increase £49,549); rateable, £5,406,719 (increase £33,443). The Chairman of the Committee (Mr. W. H. Wagstaff), in submitting the report, said the largest and most difficult task before the Committee was the appeal of the Metropolitan Water Board, who sought to establish a new method of assessment, which, if successful, would inflict upon the City an annual loss of nearly £40,000 gross value. The Committee could not, upon their own responsibility, accept so great a loss to the ratepayers; and the problem, in their opinion, was one which should be decided by the Law Courts only. Should the Board succeed in the action, it would be a signal and important example of the disastrous effect that equalization of rates would have upon the pockets of the City ratepayers. This "equalizing" of assessments, in addition to the proposals contained in the Board's Bill now before Parliament to equalize the cost of water, would place an outrageous burden upon the citizens; and he could only wonder how long they would consent to bear it. The report was unanimously adopted.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by our Correspondents.*]

Gas Coal Prices.

SIR,—Your articles and the reports of the speeches of some of the gas producers do not escape the notice of sellers here. I, as one who has some knowledge of the inner workings of a colliery concern, can claim to say something on the matter.

There has been some hard hitting by some of the London Press and gas managers against the Durham coalowners. Do you think it can serve any useful purpose all these strictures? My opinion is that it has the tendency of getting the colliery owners' backs up; and, quite naturally, seeing "how the cat jumps," they will not risk holding their coals for London, when foreign buyers are ready to seize upon any chance of securing them—usually at their own figures. Do not imagine that coalowners have forced up the prices; this has been done for them by the foreign buyers. Would you, having the chance of a twelve-and-sixpenny price, go to another buyer and say: "I will take ten-and-sixpence, because you are a Britisher?" Hardly. We rather think you are like us all—that is, gifted with a bit of human nature.

Now as to the Rotterdam gas contract. I think I can enlighten you as to the real facts of the case. Although they have placed their contract with a German Syndicate, yet it is with the option of delivering English coal to them, and I may say a large proportion of Durham coal will be supplied—part of the contract having already been placed in this county. The Syndicate are very large buyers of British coal, and have their own Agent in this city for the purpose of buying. I may say they pay current prices.

Although the Durham owners may lose the London contracts this year, they do not despair of having any idle time. Yet, when London comes again next year, they will doubtless give London the first chance of buying. Although coalowners here have not secured their usual quantities, they have the greatest respect for the London Companies, who are perfectly justified in buying in the cheapest market.

"IN THE KNOW."

Milburn House, Newcastle-on-Tyne,
April 11, 1907.

[This letter is referred to in our editorial columns.—ED. J.G L.]

Field's Analysis.

SIR,—Referring to the article relating to the above in your last issue, I am much obliged for the suggestions you make. As a portion of the 1906 edition is now in the printers' hands, I am unable to make any alterations in the contents this year, and am afraid some of the additions you propose—although, no doubt, the information would be interesting—are rather outside the scope of the publication.

I will, however, bear your remarks in mind, and hope to be able to embody some of the suggestions in future issues, and thus add to the usefulness of the tables.

GEO. ORFORD.

Richmond, April 12, 1907.

Gas Profits and the Rates.

SIR,—There are some circumstances in this world where plain, common sense is more valuable than abstract science. This applies to at least one domain—viz., the administration of gas profits by town councils and municipalities.

The latest example is the good fight made by Mr. Thomas Duxbury against the Darwen County Council, over a proposal to devote the profits accruing from the supply of gas to a reduction in the rates. This has been too often done, directly or indirectly, in cases where municipalities have the public gas supply under their control; but the whole question, to use a colloquial phrase, is "in a nutshell."

The gas consumer pays his fair share of the general rates. Why should he, then, be further taxed because he is a gas consumer, while those who use electric light are left out? The gas consumer has a reasonable right to consider that profits derived from the manufacture and supply of gas should be directed to a reduction in price, especially in the case of the supply from a municipality. He should not be regarded as an easy source of profit to be used for the general benefit of the average ratepayer.

H. LEICESTER GREVILLE.

Bromley, April 11, 1907.

Replacement of Exhausted and Obsolescent Plant.

SIR,—A paper lately read before the Institute of Bankers, on the above subject, by Mr. Leake, Chartered Accountant, deserves more than passing recognition. It emphasizes the requirement for proper provision for economic wastage in connection with joint-stock and municipal enterprise, and indicates a method by which this can be secured automatically. Briefly, the proposal is that all joint-stock and municipal undertakings should be required to tabulate, in standardized form, the economic life of the various items of plant used in such undertakings, and to set aside each year a certain percentage, calculated on this basis, that shall be sufficient to replace the plant entirely at the end of the stated term. Repairs and partial renewals to keep it in working order will, of course, be provided for, as now, in addition. While a considerable amount of clerical labour would be involved in this apportionment, it would obviously be more than repaid by the gain in placing such enterprises on a safer economic basis.

A number of undertakings unwisely sail very close to the wind for the benefit of present distribution; but sooner or later the absence of available cash reserve is bound to be felt. The view that maintenance out of revenue is sufficient, is quite fallacious, as there is clearly a point beyond which repairs cannot go. On the other hand, sinking fund allowances, which are merely for the redemption of borrowed capital (unless a special margin be allowed for the purpose), cannot

take the place of the suggested reserve, inasmuch as plant may become obsolescent long before the period for repayment of such borrowed moneys has matured.

The question is one of great importance, and is at present insufficiently appreciated; and the author of the paper has rendered distinct service in indicating a method by which the interests of both shareholders and ratepayers may be more adequately protected. As is well pointed out, any divergence from the approximately correct statement of probable economic life, with a view to some smaller apportionments, would defeat the object by laying this particular undertaking open to suspicion.

April 8, 1907. H. REGINALD SIBSON, F.C.I.S., A.S.A.A.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—KING'S BENCH DIVISION.

Tuesday, April 9.

(*Before Mr. Justice* LAWRANCE *and a Special Jury.*)

Chemische Fabrik, &c., v. Septimus Beven—The Quality of "Vivid" Mantles.

This was an action brought by the plaintiffs to recover £727, the balance due on certain bills of exchange; and the claim was admitted subject to defendant's counterclaim. In this it was set forth that the plaintiffs were patentees of a gas-mantle, and that Dr. Willy Saulmann was the Managing-Director of the Company, which was incorporated in Berlin. The defendant trades, in co-partnership with Mr. C. J. Alexander, under the style of the Vivid Incandescent Mantle Company. By an agreement dated Sept. 10, 1902, made between the plaintiffs and the defendant, the latter agreed to purchase all the mantles he and his partner required during a period of three years from the date of the agreement—such mantles to be of the best possible quality. In order to distinguish them from others, they were to be of a particular colour, and stamped with the words "Vivid Patent." Between April and September, 1903, the defendant and his partner ordered about 5000 gross of the mantles, and gave the nine bills of exchange sued upon. But on taking delivery of a portion of them, he found they were of very inferior quality. His customers complained, and in many instances returned the mantles and cancelled the orders; so that between September, 1903, and September, 1904, defendant's turnover showed a decrease of £7000, and a consequent loss of profit of at least £2000.

Mr. F. LOW, K.C. (who, with Mr. J. R. MACOUN, appeared for the defendant), said the bills which Mr. Beven gave in 1904 were dishonoured because he refused to pay them; and the plaintiffs then brought an action. So far as the bills were concerned, there was no defence, subject to such damages as the Jury might award defendant for the way in which he had been treated. The plaintiffs at the last moment had given notice that they did not intend to come to the Court to defend the counterclaim; and as they were a German firm, it would be difficult to get any effectual remedy against them. He asked the Jury, however, to give defendant a verdict which would prevent him being further troubled on the bills, and ensure him against additional loss. In consequence of the inferior quality mantles supplied, his business had been practically ruined.

Mr. *C. J. Alexander* said he was the working partner with the defendant, who found the money for the business. They traded as the Vivid Incandescent Mantle Company, and in 1902 entered into an agreement with the plaintiffs to acquire from them the English patent of a gas-mantle manufactured by them; the purchase-money to be paid by instalments. While these were being paid off, there was nothing to complain of in regard to the quality of the mantles; but directly the last payment was made they became inferior, and a great many were thrown on their hands. In 1902, the first year of the agreement, the total sales amounted to £2700; and in 1903, to £8350. In 1904, however, they went down to £3000; and in 1905, to £450. There was no cause for this, except the bad quality of the goods. They supplied the Gaslight and Coke, South Metropolitan, Ipswich, and a number of other gas companies and district councils. They had embarked in the business about £6000; and in consequence of the action of the plaintiffs the greater part of this money had been lost.

Mr. *Walter Macdowall*, the Deputy Chief Stores Clerk of the Gaslight and Coke Company, said while the mantles were good the Company did business with the defendant to the extent of £300 a month; but the purchases fell off to nothing, owing to the indifferent quality of the mantles supplied.

Mr. LOW said he had similar evidence from the South Metropolitan Gas Company and others.

His LORDSHIP, however, intimated that Counsel need not call it, as the plaintiffs did not appear.

The Jury returned a verdict for the defendant for £1000 damages; and judgment was entered accordingly, with costs, subject to the £727 being set off.

THE PROMOTION OF THE KENT COUNTY GAS COMPANY.

At the Board of Trade Offices, Carey Street, W.C., last Wednesday, creditors and shareholders of the above-named Company met to select a Liquidator to act under the winding-up order made on the petition of shareholders, as recorded in the "JOURNAL" for the 26th of February (p. 545). Mr. H. E. Burgess (the Official Receiver) reported that the Company was formed in May, 1906, with a nominal capital of £50,000, to acquire from Mr. Harry Warwick Gyde and Mr. Walter Darby (trading as F. C. Lawson and Co.), as a going concern, a small gas undertaking at Goudhurst, Kent. The purchase price was £21,800, and was paid in cash; and it appeared that a few weeks prior to the formation of the Company Messrs. Lawson and Co., in the name of "Darby and Co.," acquired the property for £2350. They spent about £90 only on the works before selling them to the Company; so that practically the whole of the difference between £21,800 and £2440 represented profit to them on the re-sale. The purchase agreement further provided that Messrs. Lawson and Co. should pay the expenses of forming and registering the Company, and that they should guarantee the payment of the first year's dividend on the preference shares, and a dividend of at least 8 per cent. on the ordinary shares for the same period. A prospectus was issued on May 14, 1906, inviting subscriptions for the whole of the preference and ordinary capital. It stated that the subscription list would open on May 15 and close on or before May 21, and that the maximum subscription on which the Directors would proceed to allotment was 50 per cent. of the amount offered. On May 16, an article unfavourable to the Company appeared in a daily newspaper; and on that and the following day a number of telegrams and letters were received by the Company from applicants for shares, withdrawing their applications. Shortly after the Company had gone to allotment, certain shareholders took action to obtain the removal of their names from the register of members and the return of the money paid on their shares. An action affecting 23 shareholders was tried last November, and resulted in judgment being given for the plaintiffs. The Company obtained leave to appeal upon paying into Court the amount due to the shareholders. Further actions subsequently came before the Courts, with the same result; and in each case the Company appealed. The appeals were pending at the date of the winding-up order; the amount in Court being £1511 17s. 2d. The result of the trading for the eight months during which the Company carried on business was a loss of £30, which figure was arrived at without charging Directors' fees or the heavy law costs incurred in connection with the shareholders' actions. The accounts filed under the liquidation showed liabilities £5559, and assets valued at sufficient to yield a surplus; but with regard to contributories, a deficiency of £20,281 was disclosed. The liquidation was left in the hands of the Official Receiver and a Committee of Inspection.

In the Chancery Division of the High Court of Justice last Thursday, the case of *Freeth v. Kent County Gaslight and Coke Company* was mentioned before Mr. Justice Swinfen Eady. Mr. Clausson asked that the matter should be allowed to stand over. He said that several actions had been brought against the Company for rescission of contracts to take shares; and in each case the plaintiff had succeeded. A winding-up order had intervened since the present action was brought, and a meeting of creditors and contributories had been held, and they were in favour of the Liquidator being continued. His Lordship allowed the case to stand over for a fortnight.

South Metropolitan Assessment Appeal.

The hearing of the appeal by the South Metropolitan Gas Company against the assessment of their undertaking in the Woolwich Union, the Greenwich Union, the Borough of Lewisham, and the Borough of Bermondsey—which, at the conclusion of the third day's proceedings on March 2, was adjourned *sine die*—was resumed yesterday at the Sessions House, Clerkenwell. Mr. Frank Bush, the Secretary of the Company, recalled and further examined, said the interval between the slot collections during the account year was 5 weeks 4½ days. He produced a table of weekly receipts from ordinary consumers, from July, 1904, to November of that year; and he also put in a table of cash received for residuals for the four months July to October, 1904, showing £161,431, as compared with Mr. Ryde's figure of £168,996 for four average months. Cross-examined by Sir Ralph Littler, witness stated that the reduction of 2d. per 1000 feet was made because the Directors had the money. He thought this an excellent reason. After the last appeal, notices were sent to certain parishes as to the Company's intention to raise the price of gas. These were withdrawn when the Assessment Committees agreed to a modified figure. At meetings with all the Assessment Committees, with the exception of Lewisham, the accounts for the half year ending June, 1905, were handed in either by Sir George or himself. He believed that all calculations made by the valuers and discussed before the Committees were on the accounts for the year 1904. The slot system was not progressing now so fast as formerly, and would not grow anything like so rapidly in the next ten years. Mr. H. E. Jones explained the inlet and outlet connections of prepayment meters, and put in a valuation based on the year to June 30, 1905. His tenant's capital was the same as Mr. Ryde's, with the one exception of slot fittings. Mr. Ryde had depreciated them 50 per cent., but witness considered 40 per cent. was correct. The hearing was adjourned until to-day (Tuesday). A report of both days' proceedings will appear next week.

Interesting Point in a Water-Rate Dispute.

At the Westminster County Court last Thursday, an action was heard before His Honour Judge Woodfall, in which Mr. Archibald Clothier, of Wanstead Park Road, Ilford, sought to recover from the Metropolitan Water Board the sum of 1s., which he alleged he had overpaid in respect of water-rates for his house. Though the amount in dispute was trivial, the action raised an important point of procedure of interest to both consumers and suppliers of water. Mr. Hildesheimer, the Counsel for the plaintiff, in opening the case, was proceeding to show that there was a dispute between the plaintiff and the Board in regard to the basis of assessment on which the water-rate was levied, when Mr. J. W. Ross Brown, instructed by Mr. Walter Moon, the Solicitor for the Board, took the objection that, inasmuch as it was admitted that there was a dispute as to the basis of assessment, the County Court had no jurisdiction to entertain the claim. He pointed out that by section 68 of the Water-Works Clauses Act, 1847, the annual value, where there was any dispute as to the amount, was to be determined by two Justices of the Peace. An authority was cited to show that this was a condition precedent to the bringing of any action by water authorities to recover rates, or by any consumer who felt himself aggrieved by the basis of assessment—this applying both to the County Court and the High Court. His Honour upheld the objection, and gave judgment for defendants, with costs on the higher scale, as the action involved a question of general importance.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.

The following further progress has been made with Bills :—

Bill read a second time and committed: Newquay and District Water Bill [Lords].

Bills read the third time and passed: Basingstoke Gas Bill, Brockenhurst Gas Bill, Keswick Urban District Council (Water) Bill, Maidstone Gas Bill, Mitcham and Wimbledon District Gas Bill.

The Committee of Selection have nominated Sir John Randles, Mr. C. Duncan, Mr. Rose, Mr. Whitbread, and Mr. Luke White to serve on the Joint Committee of Lords and Commons on the Metropolitan Water Board (Charges, &c.) Bill and the Metropolitan Water Board (Various Powers) Bill.

KINGSTON-UPON-HULL CORPORATION BILL.

Police and Sanitary Committee of the House of Commons.

Tuesday, April 9.

(Mr. CORRIE GRANT, *Chairman*)

By this Bill power is sought by the Corporation, among other things, to acquire compulsorily the undertaking of the East Hull Gas Company, who appeared in opposition.

The Hon. J. D. FITZGERALD, K.C., Mr. RAM, K.C., and Mr. W. J. JEEVES appeared for the Corporation (Messrs. Sharpe and Co., Agents); and Mr. BALFOUR BROWNE, K.C., Mr. HONORATUS LLOYD, K.C., and Mr. A. M. PADDON represented the Company (Messrs. Martin and Leslie, Agents).

Mr. FITZGERALD, in opening, said the only part of the Bill that was opposed was that relating to gas, under which the Corporation proposed to acquire the undertaking of the Company. Until recently Hull was supplied with gas by three different Companies. The old City of Hull up to 1898 was supplied by the Kingston-upon-Hull Gas Company, which was the oldest. Then another portion was supplied by a Company, now known as the East Hull Gas Company, but whose title up to last year was the Sutton, Southcoates, and Drypool Gas Company. The third Company, the British Gaslight Company, still supplied a large portion of Hull on the west. In 1897, the Corporation obtained an Act by which they acquired the undertaking of the old Kingston-upon-Hull Gas Company at an agreed price, and came into possession on March 31, 1898. The result of the transfer to the Corporation had been eminently satisfactory from a public point of view, for the price of gas had been reduced from 3s. to 2s. 6d. per 1000 cubic feet. The number of consumers had been considerably increased. There had been no charge upon the rates at all. The Corporation had been able to pay out of the returns from the undertaking all the expenses of interest and sinking fund; and, in addition, they had made a profit, the bulk of which had been applied to the reduction of the capital debt. The works of the old Company were most inconveniently situated. These had been pulled down, and terms had been come to in 1900 with the British Gaslight Company to supply the Corporation in bulk at a price of 1s. 6d. per 1000 cubic feet. There was no limit. The Corporation undertook the distribution. This had worked out most satisfactorily from every point of view. The pulling down of the old gas-works had been a considerable public improvement; and the consumers of gas in the area were getting a supply at 6d. per 1000 cubic feet less than they paid to the old Company. It had for many years past been the intention of the Hull Corporation to acquire the undertaking of the East Hull Gas Company whenever the opportunity arose; and the opportunity came last year. The Company had expended the whole of their capital; so that the original concession had come to an end. They were therefore obliged to come to Parliament for fresh capital and further powers; and the Corporation opposed the Bill of last year on the ground that the time had arrived when the works ought to be transferred on proper terms to the Corporation of Hull, and that no new concession ought to be given to the Company to enable them to carry on their undertaking for many years further. As a result, a clause was inserted in the East Hull Gas Act of last year relating to the purchase of the undertaking. He believed in every case where the gas supply had come into the hands of the corporation of a large town, the results had been very satisfactory alike to the consumers of gas and to the ratepayers of the town. In the twenty-two years between 1879 and 1901 there were 132 cases in which Parliament had authorized the transfer or the setting up of gas undertakings by local authorities. On the question of the corporation management of public undertakings, the record of the Corporation of Hull was excellent. Counsel next dealt with the history of the East Hull Gas Company. From 1867 they had been paying their maximum dividends, and there had happened here what often happened in such a case—that the shareholders could get nothing more out of the concern than the dividend which they had actually received for years, and which was perfectly well secured. The result was a sort of sleepy management, a want of enterprise, and a want of pushing the business. Within the district of the Company there lived a large number of the working classes; and of late years it had been found that these people appreciated very much the supply of gas by prepayment meters. This added largely to the number of consumers; and where a gas company were enterprising, it added largely to their profits. In this case, the Company had not pushed the sale by these meters at all. He understood that, though they would supply the meters, they did not supply the fittings along with them—the gas-fittings inside the house. In the district supplied by the Corporation there were more consumers of gas than there were inhabited houses. In the district supplied by the British Gaslight Company the consumers were 73 per cent. of the inhabited houses; but in the area at present being supplied by the East Hull Company the consumers were only 40 per cent. of the inhabited houses. The price of the Company's gas from 1900 to 1906 was 2s. 6d. per 1000 cubic feet. When the Corporation announced their opposition to the Bill of last year, the price was reduced to 2s. 4d.; and when it was decided to promote this Bill, the price was promptly reduced to 2s. The reduction to 2s. 4d. was a legitimate reduction which might have been made before; but the accounts of the Company showed that at the price of 2s. they could not earn their maximum dividend. He did not mean they would not pay it—they would pay it out of the reserve fund, no doubt; but they could not earn it. If this Bill were not to pass, they would be obliged immediately to put up the price again. By passing this Bill they would place the control of the streets in the district entirely in the hands of the Corporation. Again, they looked forward to a very considerable economy in the management. Unaccounted-for gas was very high in the case of the Company. It was also very high with the old Kingston-upon-Hull Company; but since the undertaking passed into the hands of the Corporation, this had been reduced by about a half or more.

The CHAIRMAN: Isn't that partly explained by the fact that you are buying in bulk, and have got rid of your works?

Mr. FITZGERALD thought that it was explained by the fact that the mains had been looked after. In reference to the East Hull Company, their unaccounted-for gas was more than double that in the district of the Corporation, and more than three times that in the district of the British Gaslight Company. There was no lack of precedent for what the promoters were asking the Committee to do. In this case, looking at all the circumstances, they submitted that a proper time had come for the transfer of the undertaking. Having referred to the proposal as to the transfer, Counsel said that, following the clause of last year, the decision of the Committee was "(*a*) for the purpose of determining such price or consideration the value of the undertaking of the Company shall not be enhanced or depreciated by the passing of the East Hull Gas Act, 1906, or by anything therein contained." Then "(*b*) no allowance shall be made for compulsory sale; but the arbitrators or umpire who shall determine such price or consideration may make such allowance as they think just for recoupment of any loss of interest pending reinvestment, as well as for the cost of reinvestment, and for covering any costs, charges, and expenses other than costs incurred in any arbitration under this Act which have been, or are likely to be, incurred in consequence of the passing of this Act by the Company or the stockholders therein and which ought, in the opinion of the Court, to be borne by the Corporation." This clause was taken almost verbatim from a similar clause in the Act of 1901, under which the London Water Companies were taken over by the Metropolitan Water Board. Then it said that the Corporation were to give notice that they would purchase the undertaking within six months; and by sub-section 3 the Company were to be repaid the moneys which they had reasonably expended in obtaining the Act of last year. Until recently the Company were willing to sell—it was only a question of price; but when the Corporation officially approached the Company, they declined to discuss the matter at all, or to meet the Committee of the Corporation in charge of the matter.

The CHAIRMAN: This was after you had given notice of the Bill last November.

Mr. FITZGERALD said he felt certain that if this Bill passed no single shareholder in the Company would have any reason to complain, because, under the terms of the Bill, the shareholder would get absolutely the full value of his holding. There was no opposition to the Bill apart from that of the Company. Having dealt with the petition presented by the Company, Counsel said they had taken under their protection the consumers of gas outside who were anxious that the transfer should take place. The Committee were aware that in almost every case where a large town had the supply of gas in its hands it supplied districts outside its municipal boundary; and that was for the advantage of the district outside, because they got a supply of gas from a large concern at a price which they could not hope to get it at if they set up an undertaking of their own. He thought they would find that was the case in Birmingham, Manchester, and Salford, and in almost every large town where the supply of gas was in the hands of the municipal authority. The provisions of this Bill, he maintained, so far as the shareholders were concerned, most amply protected their interests, and prevented any possible injustice being done to them.

Mr. *Edwin Laverack*, the Town Clerk of Hull, examined by Mr. RAM, said the present population of Hull was 262,426; and its rateable value was £1,156,431. In twenty years between 1881 and 1901 there had been an increase of about 21 per cent. in each decade, and the rateable value had doubled—rising from £586,676 to the present figure, during the last 25 years. The Corporation had the most important undertakings in the city in their hands. They had the water, tramways, electric lighting, telephones, and markets, and they also supplied a small part of the city with gas. The water undertaking was an eminently satisfactory business. In 1901, the indebtedness in respect of this was £284,266; and it had gone down gradually until in the year 1906 it was £264,179. They had never borrowed anything for capital expenditure in regard to the water undertaking for the last fourteen years. They had, of course, laid miles of mains in new streets, which was capital expenditure; but they had not borrowed any money for the purpose. They had paid it out of revenue; and during the whole of this time they had been paying off the indebtedness, by means of the sinking fund, and also putting in aid of the rates the amounts that were mentioned by Mr. Fitzgerald. He believed that during the fourteen years from 1893 to the present time, they had spent over £110,000 in capital expenditure out of revenue. They had also maintained their reserve at the statutory figure, notwithstanding that they had made large payments in aid of the rates. During the six years from 1901 they had paid £36,000 in relief of the rates. On the gas undertaking there had been during the six years a gross profit of £21,362. There was an item "interest and sinking fund charges £16,141," which left a net profit of £5221. The price of gas when taken over by the Corporation was 3s. per 1000 cubic feet, and it was kept so for one year. In the following year it was reduced to 2s. 10d. In 1901 there was a further reduction to 2s. 8d.; so that they reduced the price by 4d. per

1000 cubic feet while they were manufacturing as well as distributing the gas. At the end of 1903, there was a further reduction to 2s. 6d. There had been a reduction in the price of electricity for lighting and power by ½d. per unit from April 1, 1901, which accounted in the first place for the loss which accrued in an ordinary year when there was a loss—viz., 1902. The present price was 4d. per unit for lighting and 2d. for power, down to 1d. to large consumers. They supplied electricity to their own trams. On the electric lighting undertaking they had borrowed £325,110. The depreciation was £2817. He should have liked to have put down more; but they had a reserve fund of £13,100. They had put nothing to the relief of the rates out of this; they had put it all to depreciation and reserve. In addition to the depreciation fund, they had paid off £52,722—they had reduced the capital by this amount. The gas part of the Bill was the outcome of what took place in Parliament last year. That Bill empowered what was now the East Hull Gas Company to raise additional capital. The Corporation opposed the Bill, with the object of obtaining the power of purchasing the undertaking; and they got their clause in the Act of last year. With regard to the position of the city as regarded the supply of gas, there were three separate undertakings in Hull. The Corporation supplied part of the city within the docks called the Old Town. Then there was the East Hull Company, who supplied the part east of the River Hull, and also the parish of Sutton, outside the city boundary. The British Gaslight Company supplied the west part of the city, and also the outlying portion of the district called Cottingham. Up to 1898, the old town, which was now supplied by the Corporation, was supplied by a Company known as the Kingston Gas Company, who were for many years the only Gas Company in Hull. In 1897, the Corporation obtained power to purchase this undertaking, and afterwards did so, at a total cost of £92,500, with an annuity to an Engineer of the commuted value of £1500. The Corporation instruction originally included both the purchase of the Kingston gas undertaking, and also that of the East Hull Gas Company, which they now hoped to carry out. They afterwards entered into an agreement with the British Gaslight Company for the supply of gas in bulk at 1s. 6d. per 1000 cubic feet. Since then they had been able to pull down the old works, to make an important street improvement, and to extend the Town Hall. In January, 1906, there was an interview between the Corporation Parliamentary Committee and a deputation from the East Hull Company. The result was: "Purchase clause. The Company consider this absolutely impossible, and will oppose compulsory purchase by arbitration." The Corporation, having purchased the Kingston Gas-Works, were anxious to know how they could themselves manufacture and supply gas. They wanted to have a little experience of what the result would be before embarking upon anything further. Now the time had come when they might justifiably ask for the purchase of the East Hull Gas-Works. This was approved of at a meeting of the Corporation by 40 votes for and 7 against. A poll was demanded; and the result was that there were 3143 who voted for, and 2427 against. The total number of votes in Hull was 50,000 in round numbers. At a second special meeting of the Council, 48 voted for, and 2 against. The Corporation were the largest customers of the Company—using 20 million cubic feet annually for about 1000 public lamps. They paid the Company, in round figures, something like £3500 a year.

In cross-examination by Mr. HONORATUS LLOYD, witness said that, notwithstanding the fact that the Corporation's rateable and assessable values had increased substantially and all the profits had in recent years gone in relief of the rates, the rates had risen from 6s. 5d. to 7s. 3½d. in the pound. In 1901, the gross profit on the gas undertaking was £4584. In 1902, it dropped down to £3619, which was to some extent accounted for by the reduction in the price. There had been a drop of £1000 in the gross profit on the electricity undertaking. He did not think there was keen rivalry between gas and electricity. Those who wanted gas took it; and those who wanted electricity took it. Many people did not take electricity because it was dearer; and that was why they had reduced the price, in order that they might better compete with gas and increase the consumption. They wanted to make the best of both undertakings.

Mr. HONORATUS LLOYD: Your hands are already full?

Witness: Yes; we have already acquired one Company.

Inasmuch as your hands are now grasping a debt of £3,000,000 odd, as against £1,000,000 odd, do you consider that you have now more time available for dealing with this gas undertaking?—I am not referring to that at all. I mean that every department is full with regard to street improvements.

As a matter of fact, after you had acquired the district of the Old Company, you sought, did you not, tenders from the two Companies—the British Gas Company and the East Hull Company?—Yes.

Is it the desire of the Corporation to supply the whole of the city with gas?—Of course, there has been no resolution of the Council to this effect, and I cannot say. I should think probably. It is one of those things that develops.

Alderman *Frederick Lavard*, examined by Mr. JEEVES, said he was certainly in favour of the gas undertaking being acquired by the Corporation. Being strongly of opinion that all the roads of the city ought to be under one control, he was decidedly in favour of the proposal. The Corporation had been quite consistent since 1897-98 in their desire to provide for, and make the same arrangement with regard to, the East Hull Gas Company as they were with regard to the Kingston Company. For three or four years at least before the East Hull Company came to Parliament he had, as Chairman of the Works Committee, conferences with different colleagues, and also with officials who would have charge of the matter, with reference to the time when they should apply for the powers they were now seeking. According to the best advice he had given him, the time was when the Company went to Parliament for further powers. Another matter which influenced him as well was that, out of all the corporations who had taken over gas companies during the last twenty years who manufactured over 50 million cubic feet of gas, only four had made a loss; and these happened to be corporations who bought their gas-works by private negotiations. As a business man, he thought the better way was to buy by arbitration and not by agreement.

Mr. *T. R. Ferens*, M.P. for East Hull, was the next witness. He said he was a Director of the firm of Reckitt and Sons, Limited, whose works were situated in the district supplied with gas by the East Hull Company. He was in agreement with the suggestion that the Corporation should be given power to purchase.

In cross-examination by Mr. BALFOUR BROWNE, witness said he had no fault to find with the Company; but his firm had electric light, and were no great consumers of gas. They took the electric light from the Corporation. Asked if it was not healthy to have competition between two illuminants, witness said he thought they could hardly compete when they were not required for the same purpose. Gas was required for cooking; and therefore they did not come into competition. He thought the management of the two concerns together, gas and electricity, would be more economical.

Dr. *James Savage*, representative of Sutton on the Rural District Council, examined by Mr. RAM, said that the people of his district, who had at first opposed the Corporation Bill, had been met in a reasonable spirit by the latter, and had withdrawn their opposition. Six or seven conditions were insisted on by their Clerk at Sutton; one being that the Corporation should sell gas in Sutton at the same price as they sold it in Hull. Another condition was that they should not make a profit out of Sutton and apply it to the relief of the rates in Hull. There were two or three other legal matters which satisfied their Clerk. He believed these were in the Bill.

Wednesday, April 10.

Consideration of the Bill was resumed this morning.

Mr. *F. J. Bancroft*, the Gas Engineer to the Hull Corporation, gave details as to the capital and share issue of the East Hull Gas Company, borrowed capital, &c., and said that the effect of the issue of shares at par, instead of at a premium, was to increase the price of gas. If the Company had received a premium of capital on which they had to pay no interest, they would have been able to have kept the price of gas lower. Assuming that the whole of the shares had been issued at £15 per share, it would have resulted in an amount equivalent to £1900 per annum, or about 2½d. per 1000 cubic feet of gas. This was the £76,000 issued under the Act of 1867, assuming it had been issued to pay 5 per cent. instead of 7½ per cent. On December 31, 1905, in the British Gaslight Company's limits, the number of consumers was 73 per cent. of the inhabited houses. On the same date the percentage in the East Hull Company's limits was only 40. He thought this showed want of enterprise on the part of the management. As to the Corporation's limits of supply, the number of consumers was more than 100 per cent. of the inhabited houses. This was owing to the peculiar circumstances of the Old Town district within the docks. In 1905, the consumers had increased and the number of inhabited houses decreased. As to the East Hull Company's make and sale of gas, he had divided the latter between private consumers and public purposes. In 1906, the amount for private consumers was 167 million cubic feet, and for public purposes 20 millions; the latter for the most part supplied to the Corporation, who were the largest customer. The explanation of the falling off in 1906 was due to incandescent burners being placed in the public lamps. In 1902, there was over 12 per cent. of unaccounted-for gas; in 1906 there was an improvement—it having fallen to 7·9 per cent. The make of gas in the British Company's district for the year ended Dec. 31, 1905, was 1123 million cubic feet, as against a total make of 177 millions in East Hull, and 86 millions in the Corporation district. Witness proceeded to give a comparison of charges made by the Company for gas to private consumers. For the year 1905 the profit was £10,262; and the amount required to pay the dividend and mortgage interest was £7625. This left them an excess of profit of £2637, which was equivalent to 3½d. per 1000 cubic feet of gas. The next year the profit was £7763, and the amount required for interest and dividend was £7701; leaving only an excess of £62. The Corporation having given notice to promote this Bill last October, the Company, on Nov. 30, announced a further reduction of 4d. per 1000 cubic feet, bringing the price down to 2s.

Mr. FITZGERALD: What effect will that have upon their returns?

Witness: The 2d. reduction in 1906, *plus* the 4d. reduction which will take effect during 1907, will make a reduction of over £4000 per annum in the income of the Company. This would leave a substantial deficit on the working of the year. The consumers of gas in the Corporation district are quite satisfied with the change that has taken place.

Cross-examined by Mr. HONORATUS LLOYD, witness said that, with reference to the issue of capital, his complaint was that the Directors did not exercise their option of selling by auction. He considered that the Company, being a maximum-dividend concern, dealing in what was practically a monopoly, and having sufficient capital to keep them out of Parliament for forty years, exercised their option improperly, to the detriment of the consumers and to their own advantage. The capital of the Company per million cubic feet was about £600, which was a fair amount. Cambridge was £568 per million; Exeter, £550; Watford, £461; Ashton (Lancashire), £265; Kettering, £443; Walker and Wallsend, £427; and in the British Gaslight Company's district adjoining, £391. Asked how this compared with similar undertakings in the immediate vicinity, witness said he believed it was reasonable; but that did not say that it might not have been better. If their Bill was successful, and they had to raise money to purchase the undertaking, he considered that 5 per cent. per annum would pay sinking fund and interest.

Mr. HONORATUS LLOYD: If you get what you ask for as against the consumers, then you can charge 10 per cent. on the capital as against our 7½?

Witness: There is no probability of that. The Corporation are a popularly elected body, and subject to outside influence. They will not charge 5 per cent. in addition to their sinking fund and interest and put it to the relief of rates.

If the Corporation get this undertaking, is it likely to be kept at a uniform price, irrespective of expense?—I do not say that; but I do not believe in making violent reductions and then having to raise the prices the next year.

Witness went on to say that the amount of gas sold per ton of coal carbonized was one of the tests of the management of an undertaking. In the East Hull district in 1906 it was 10,491 cubic feet, as against the

British Company's 10,193 cubic feet. He believed the Corporation were seeking to be tied to the same quality as the Company (14 candles), and that the model clause changed the test for illuminating power.

Mr. HONORATUS LLOYD: While you seek to maintain the same maximum charges, and while you take credit for being able to manage better, you seek by the Bill to supply an inferior article?

Witness: In the Bill as first deposited we did not do so. We have been forced into this position by the Local Government Board.

In re-examination by Mr. FITZGERALD, witness said that both with regard to testing and illuminating power he was following the most recent precedents.

Mr. *J. H. Fisher*, J.P., the Vice-President of the Hull Incorporated Chamber of Commerce and Shipping, &c., said he favoured the acquisition of the gas undertaking by the Hull Corporation. He thought this was one of the things that municipal bodies should attain, along with water and tramways, although he was not absolutely in favour of municipalization of some things. He believed the consumers were likely to benefit. Having had experience as Chairman of the District Council, he thought it was an advantage to the authorities to have the gas in their own hands for the laying of pipes.

Mr. *E. H. Stevenson* said that last year he advised the Corporation upon this matter and inspected the works of the Company; and this year he had inspected the area. It was a district which ought to have a great many more consumers in it than it had to-day. Throughout Yorkshire the average of gas consumers to inhabited houses was somewhere about 75 per cent., and in other towns—or in a certain town which he had experience of—it had risen as high as 97 per cent. A large proportion of people took gas; and where they found so low a proportion as this (40 per cent.), it showed either that the people did not like the Company or that the Company had not been progressive. Assuming the undertaking was to pass into the hands of the Corporation, so that the supply of gas both in the Old Town and in the East Hull district was in their hands, there was no doubt it would tend to reduce the price, both in East Hull and still more in the Old Town. They could manufacture gas and supply it at their present meters to the Old Town for about 1s. 3d. to 1s. 3½d. per 1000 cubic feet, instead of paying 1s. 6d. as they now did. The concern in the hands of the Corporation would turn out some 280 million cubic feet of gas a year. The cost into the holders, taking the average for the last four years, had been about 13d. per 1000 cubic feet. They would require to spend something rather less than £15,000 to increase the gas-works and to lay a main from the works to the Old Town. This would add about 2½d. per 1000 cubic feet. If they put this 2½d. on to the 13d. they would be able to send the gas into the old town at 1s. 3½d. per 1000 cubic feet, instead of 1s. 6d. There would be a saving of about £1000 a year to the consumers in this district. In his experience, in almost all cases where local authorities had purchased gas undertakings the result had been beneficial to the consumers. This was a maximum-price and a maximum-dividend undertaking. The shareholders could not get anything more out of the concern until they came to Parliament again. They might be made into a sliding-scale company; but that would be many years hence. Nothing that they could do now could practically increase the value of their shares. They were therefore in as favourable a position to be taken over as it was possible to imagine a company to be.

Mr. FITZGERALD: I am not sure that all the members of the Committee know that, in the case of a gas company, you take the net maintainable income.

Witness: In the case of such a company as this we take the maximum dividends which can be divided, ascertain whether it is reasonably certain that they will be divided in the future, and multiply these dividends by the number of years' purchase.

The maximum dividend then, from the shareholders' point of view, becomes the net maintainable income?—Yes.

The CHAIRMAN: Can you tell me what has been about the number of years' purchase in most cases?

Witness: They have varied pretty considerably; but except in cases where there has been something which is unusual—for instance, the case of Skipton, where the Company had expended a lot of capital without authority, and where the Arbitrators had to take that into consideration—in a case such as that the number of years' purchase, as shown by the awards, has varied from about 28½ to about 25 or 25¼, I should take it, in the last ten years. I do not think it worth while going back further than that.

Here you have no disturbing element at all?—No, I do not see any disturbing element at all. Such competition as there is from electric light has already taken place, and is discounted; and the Company pay their maximum dividends even with that.

Replying to Mr. FITZGERALD, witness said there were no back-dividends and no prospective value here.

Cross-examined by Mr. BALFOUR BROWNE, witness stated that he had said practically the same thing in the Pontefract case, when before the Arbitrator he put forward, as regarded the number of years' purchase, a 4½ per cent. basis, 22 years' purchase. He gave his reason for that before the Arbitrator, who did not seem to think it was very unreasonable, for he gave his award somewhat less than he had offered the Company originally.

The CHAIRMAN having asked the number of years' purchase witness gave in the Pontefract case, witness replied that, as near as he could recollect, it was 25 years' purchase, *plus* 2½ per cent. for reinvestment; and he knocked off £100 so as not to show exactly what he had done.

Mr. BALFOUR BROWNE: If this Bill is thrown out and the Bill of last session is acted upon, we will have prospective value?

Witness: No; none whatever. You cannot divide more than the 7½ per cent. upon the present capital, and you cannot ensure that the shareholders shall obtain one penny of the capital you will issue.

In reply to further questions, witness gave Loughborough as a case where a Statutory Company not complained of had been expropriated compulsorily; and in the case of the Morley Corporation Bill of 1898 they were compelled to sell. But there never was a case which was absolutely compulsory until last session. No case was ever fought through the two Houses of Parliament until last session. Pontefract was the only clean precedent of a fight through both Houses.

Mr. *Charles Hunt* gave it as his experience that, generally speaking, there had been a reduction in price when gas undertakings were acquired by local authorities.

This concluded the promoters' case.

Mr. BALFOUR BROWNE, in urging the rejection of the Bill, argued that in this particular case there was really no substantial complaint against the Company. They had to look to the position not of what they were in the past, but what they were to-day. If they rejected the Bill, the Company had to spend the money which was said must necessarily be spent, they had to get interest upon the money that they would spend, and they would have every inducement to push the business. The reason they did not push the business, according to the Corporation, with regard to prepayment meters and other things, was that until last year they were at the end of their tether with regard to capital. Now all their capital powers were suspended. But if this Bill were got rid of, they then had the Bill of last year—a Bill carefully watched by the Corporation of Hull, and modified at their instance in the interests of the consumers and ratepayers; and they would have every inducement for the sake of the new shareholders who came in to push the business in every possible way. He claimed that a statutory company which had done its duty ought to be left alone. At the present time there were many people who thought that functions that had been carried on by private enterprise might well be in Municipal or State hands; but if any such thing as that was to be carried out as a policy it must be done, not on a Private Bill, but by a public measure. In order to justify such a Bill as this, it must be shown that there was really some public benefit to be obtained thereby. He denied that their price was excessive, and contended that corporations should not be great speculators with public money. It was not improper to speculate in water, because it was a necessity of public health; but it was entirely wrong to speculate in other things unless there was an assurance that there would not be large losses to the ratepayers. Seeing there was no harm done to the public, seeing that a most careful Bill was passed last year for their protection in respect of illuminating power and other things, so that they were safe in the hands of the Company as regulated by Parliament itself, and that there was no real complaint made against the Company, he asked the Committee to say that there had been no case made out for the expropriation.

No evidence was called for the Company. Counsel for the promoters, therefore, had no right of reply.

After the Committee had conferred,

The CHAIRMAN said: The Committee have given this matter very careful consideration. They have had opportunities, while the case has been going on, of considering the points in dispute; and they have come to the decision unanimously to approve the preamble of the Bill. They think that this is not a case of a clear precedent at all. They think that there has been evidence given by the witnesses for the Corporation that the management of the Company has not been all that it might have been. They think also that if that evidence could have been rebutted, the Company would have put their experts into the chair; and the Committee were expecting, up to the moment when Mr. Balfour Browne closed his speech, that expert evidence was going to be called by the Company. As this evidence has not been forthcoming, the Committee draw the natural conclusion that the expert evidence for the Company would have strengthened the case for the Corporation, and therefore the Committee, as I have said, consider the preamble of the Bill in respect of the matter of the gas undertaking as proved.

On the clauses,

Mr. FITZGERALD, in reply to the Chairman, said he understood that the Company took no part in the matter as to clauses; they were gone.

The CHAIRMAN: They are reserving their rights elsewhere.

On clause 5, "Company to sell their undertaking to Corporation," Sub-section A was added to carry out the decision of last year, and as to Sub-section B, "no allowance shall be made for compulsory sale."

Mr. FITZGERALD said this provision, almost word for word, was put in after discussion in the London water purchase case.

The CHAIRMAN: You cannot ask this Committee to reduce the terms which have always hitherto been given in a gas undertaking because different terms were imposed on a water company.

Mr. FITZGERALD: As a rule in Gas Acts and Water Acts up to the time of the London water purchase, no provision was put in at all on this head; it was left to the Arbitrator.

The CHAIRMAN: The common clause is the Pontefract clause of last year. It is simply the Lands Clauses Act. Can you ask us now to limit a common clause and to create a new precedent depriving private owners of what they have hitherto possessed?

Mr. FITZGERALD did not think it could be called making a new precedent, because really there was no distinction in this respect between a gas undertaking and a water undertaking. There was no *pretium affectionis* about a gas share. So long as the owner of the gas share got the full value of the share, he was exactly in the same position.

The CHAIRMAN remarked that many local gas undertakings got far more than the market value for their shares, because people liked to hold shares in their local gas-works.

Mr. FITZGERALD did not think there was any "price of affection" in a gas share.

The CHAIRMAN said he understood the Committee was bound by precedent, and were only entitled to make a new precedent where a case of public or local necessity was made out. In this case, it had been admitted that there was no precedent for this sub-clause in a gas undertaking.

Mr. FITZGERALD admitted this; but he strongly put before the Committee that there was no distinction in this respect between a gas company and a water company, though the clause in the London Water Act was an exception to the general practice as regarded a water purchase.

After conference,

The CHAIRMAN said: The Committee are unanimously of opinion that they have no authority to create precedents in any matter except police and sanitary matters. If this clause were allowed, in their opinion, it would be the creation of a precedent in a matter of finance which they quite think, if it is to be created at all, must be created by

Parliament itself in a Public Bill. The latter part of the clause, therefore, will not be allowed.

Sub-section B was struck out; and clause 5 was passed as amended.

On clause 6, "payment of purchase money and transfer of undertaking,"

The CHAIRMAN, after the Committee had conferred, intimated that the Pontefract clause 27 was a better one than this, because it provided for the payment of interest in the event of the Corporation not paying the purchase money on the date required; and he thought the clause ought to be brought into accord with it.

Clause 6 was then postponed.

Thursday, April 11.

At the outset of the proceedings to-day,

The CHAIRMAN said he wished to correct a statement made by him on the previous day, when he said: "The Committee are unanimously of opinion that they have no authority to create precedents in any matter except police and sanitary matters." The statement ought to stand thus: "If this clause were allowed, in the opinion of the Committee it would be the creation of a precedent in the matter of compensation (not of finance), which they think, if it is to be created at all, must be created by Parliament itself in a Public Bill."

Mr. H. PRITCHARD (Parliamentary Agent) said he had amended clause 6, so as to make provision for the payment of interest. This clause was passed, as amended, as was also clause 7, "receipt for purchase money," which was made to agree with the Pontefract precedent. Other clauses dealing with "compensation to officers," "transfer," "liabilities," "contracts," &c., were amended and passed.

By clause 15 (*c*) the Corporation sought power, for the purpose of the gas undertaking, to take and hold (by agreement but not otherwise) land not exceeding 7 acres in extent; but they were not to create or permit a nuisance on any such lands.

Mr. *E. H. Stevenson*, recalled, gave evidence as to the land of the Company, works, and storage.

Mr. *F. J. Bancroft*, also recalled, informed the Chairman that the Corporation intended to continue to manufacture gas on the additional 7 acres.

Mr. FITZGERALD stated that the Corporation were merely in this clause taking over the existing powers of the Company. The Corporation wanted to be in the position to buy lands whenever the lands were in the market that might be desirable for a site, either for manufacture or for storage. They could not, unless they obtained further authority from Parliament, manufacture gas on the lands they purchased. They could, however, without further authority from Parliament, store gas on the lands if they got the consent of every householder within 300 yards; and the clause was in the ordinary form, so far as he knew.

The clause was added to the Bill, as was also one under which the Corporation bound themselves not to apply to the relief of rates more than 5 per cent. of the profits of the undertaking.

Consideration of the clauses relating to the gas undertaking having been completed, the Committee proceeded to deal with the miscellaneous clauses.

Price of Gas at Loughborough.

Some discussion took place at the monthly meeting of the Loughborough Town Council in connection with a motion that the Gas Committee should be instructed to revise their rates, with a view to reducing the charges to the consumers. The proposer, Mr. Cartwright, explained that his object in bringing the matter forward was to do so before the estimates came on for the ensuing year. When the Corporation took over the undertaking, the price of gas was increased 6d. per 1000 cubic feet. Since then it had been reduced 2d.; and he thought the time had now arrived—seeing that the undertaking was more than paying its way—to ascertain whether the gas consumers could not get a little more consideration. Another speaker, Mr. Clemerson, said he did not think it fair that the gas consumers should make large profits in relief of the rates, or for any other department of the Corporation. Each department should stand on its own merits; and the money should come from the right pocket. In reply, Alderman Bumpus, the Chairman of the Gas Committee, remarked that the contention that the undertaking should stand upon its merits, and not be worked at the cost of the consumers, cut both ways; for the ratepayers had been called upon heavily to subsidize the gas undertaking in its earliest days. As a matter of fact, nearly £6000 was paid into the gas account by the ratepayers. At some time, therefore, the gas consumers had benefited by the rates to the extent of £6.00. If this had not been done, they would have had to charge a higher price for gas; so he considered the ratepayers had a fair claim to be repaid. Only £2500 had been returned in the rates; so that even now the consumers were benefiting to the extent of £3500 at the expense of the ratepayers. Every penny of reduction in the price of gas meant so much addition to the rates; and in equity he did not think the consumers had the first claim, seeing that they were already indebted to the ratepayers for unreturned money. The motion was rejected.

River Plate Gas Company, Limited.—In the report to be submitted by the Directors of this Company at the annual meeting next Friday, they state that the profit for the year 1906, including £21,222 brought forward, amounts to £156,337. After payment of all fixed charges, making the usual ample allowance for bad and doubtful debts, and providing fully for the upkeep of works, mains, &c., there remains £132,246. The interim dividend of 6s. per share absorbed £30,000, and the Directors propose to carry £20,000 to the reserve fund (raising it to £165,000), £5000 to a plant renewal fund, and £2000 to the old age and pension fund, and to pay a final dividend at the rate of 10s. per share, making 8 per cent. for the year, free of income-tax, leaving £25,246 to be carried forward. During the year, £14,112 was spent out of revenue on the upkeep of works and mains, all of which are in most efficient order. The network of mains was increased by 11½ miles (making a total of 430½ miles); and on balance 2987 new house services were connected.

MISCELLANEOUS NEWS.

PARIS GAS COMPANY.

Report of the Liquidators for the Year 1906.

The Liquidation Committee of the Paris Gas Company recently convened a general meeting of the shareholders in order to present a report on the working of the concern since the previous meeting, held about twelve months ago. M. Troost, the former Chairman of the Company, presided. Having formally opened the meeting, he called upon M. Carrès to read the report. It set forth the conditions under which the Liquidators had been entrusted with the control of the gas supply for twelve months from the date of the expiration of the Company's concession on Dec. 31, 1905, and recorded the fact that these had all been fulfilled to the satisfaction of the Administration, between whom and the Liquidators the most cordial relations had existed. The portion of the assets belonging to the Company had been transferred to the City for the lump sum of 90,000,000 frs., the addition of the interest on which produced a total of 90,895,244 frs. available for distribution among the shareholders. The share of the profits to be paid to the Liquidators for their services during the year was fixed at 10,000,000 frs. as the maximum; but it only came to 8,232,000 frs., after deduction of the reserve to meet outstanding charges. This reserve amounts to 2,948,115 frs. Totalling the items, the City's share of the gas profits for last year was 20,618,940 frs. (£824,758).

Turning to the working, it was pointed out that last year differed considerably from its predecessors. For the first time, the supply of gas in the suburbs of Paris, which was originally in the hands of the Company, was furnished by a separate undertaking—the Société d'Eclairage, Chauffage, et Force Motrice. While in the final year of their concession (1905) they had to serve a population of 3,500,000, last year the number of inhabitants depending upon them was only about 2,700,000. The consumption of gas in the environs of Paris represented about one-tenth of the total quantity supplied; yet, owing to the increased consumption in the city, the diminution was only 5½ per cent. In fact, the volume of gas sent out last year from the old works was 373,082,462 cubic metres, or about 13,172 million cubic feet, while in 1905 the figures were 394,916,259 cubic metres, or 13,944 million cubic feet; being a difference of 21,833,797 cubic metres, or 772 million cubic feet. The day consumption was 42·56 per cent. of the total last year, against 41·16 per cent. in 1905, in which year the price was 30 c. per cubic metre (6s. 9d. per 1000 cubic feet), of which 10 c. was paid by the Municipality. Last year the price was only 20 c. This reduction, taken in conjunction with the loss of the suburban supply, brought down the receipts to 68,093,203 frs. (£2,723,728), or 37,781,572 frs. (£1,511,263) less than those for the preceding year. On Dec. 31, 1905, the consumers numbered 579,588, including 42,962 in the suburbs; leaving 536,626 for the city. At the corresponding date last year, they numbered 555,720 in Paris alone; being an increase of 19,094 in the twelve months.

Before closing, by a final report, the history of the Company, it appeared to the Liquidators to be interesting to review briefly the progress of the undertaking during the fifty years of the concession. This, it may be remembered, was done in some articles which appeared in the "JOURNAL" early last year; but we take the following figures from the report now under notice. In 1856, the consumption of gas was 47,335,475 cubic metres, or 1671 million cubic feet; in 1905, as mentioned above, it was 394,916,259 cubic metres, or 13,944 million cubic feet. The receipts necessarily followed the same upward progression; being 10,309,500 frs. (£412,380) in 1856 and 105,874,775 frs. (£4,234,991) in 1905. The results of the Company's operations in the fifty years enabled them, under the terms of the concession, to pay into the Municipal Exchequer 201,316,782 frs. in the form of rent of the subsoil occupied by the mains and a tax on the gas sold, and 371,227,603 frs. as the City's share of the profits—making a total of 572,544,385 frs., or close upon £23,000,000 sterling. In addition to this very substantial amount, the City has become possessed, free of expense, of the whole of the mains, extending to about 1050 miles, and half the Company's assets, estimated at 90,000,000 frs.

As the time approached for the termination of the provisional management of the gas supply of the city by the Liquidators, it became evident that the Municipality were not in a position to take over the control themselves on Jan. 1, 1907, or to entrust it to a third party. Consequently, the Prefect of the Seine, by a letter dated the 19th of December last, requested the Liquidators to let him know whether they would be prepared to continue in the succeeding year to carry on the gas-works provisionally, subject to one month's notice from the authorities to terminate the arrangement. Notwithstanding the inconveniences attending such a *régime*, the Liquidators—acting in a spirit of conciliation, and in deference to the Administration, as well as in the interests of the shareholders—accepted the Prefect's proposal. As the result, they entered into an agreement, terminable at a month's notice, to remain responsible for the supply of gas, but not to be called upon to make any capital outlay on the works. The City were to receive all the profits; and the Liquidators were to be remunerated by a fixed sum of 275,000 frs. per month, which would be reserved entirely for the shareholders. This agreement was signed on the 31st of December, and is still in force, although, as already stated in the "JOURNAL," the new concessionary has been chosen.

Summing up their report, the Liquidators stated that they had at their disposal the sum of 99,337,691 frs., consisting of 90,895,244 frs. received from the Municipality, *plus* interest; 8,232,000 frs. the available profits for the past year; and 210,447 frs. brought forward. The above-named total, divided among the 336,000 shareholders, would come to 295 frs. 64·7 c. per share. Deducting the tax, the net sum receivable by the two classes of shareholders would be 283 frs. 82·1 c. and 282 frs. 77·8 c. per share respectively.

After a long discussion, the proposal of the Liquidators was approved.

PRESENTATION TO MR. JAMES M'LEOD.

Last Wednesday evening, a gathering of about 150 of the employees of the Provan and Dalmarnock Gas-Works of the Glasgow Corporation, with a few friends, met in the restaurant of Messrs. White and Smith, in Glanford Street, Glasgow, to do honour to Mr. James M'Leod, their former colleague, who is now Manager of the Corporation Gas-Works at Kirkintilloch. The meeting took the form of a smoking concert—Mr. J. WEBSTER, the Manager at Provan, presiding; and in the course of the proceedings Mr. M'Leod was presented with a gold curb albert and a silver salver, with an inscription.

The CHAIRMAN, in making the presentation, said he had known Mr. M'Leod for about eight years, and had come closely into contact with him. He would like to impress upon the young people present that they ought to endeavour to follow Mr. M'Leod in his work. There were no half-measures with him. Whatever he took in hand, he saw through to the end. He congratulated the people of Kirkintilloch upon getting a gentleman like Mr. M'Leod to fill the position of Gas Manager. He had no hesitation in saying that, now he had started upon the career of a gas manager, it would not be long before he was on the pinnacle of his profession.

Mr. M'LEOD, in returning thanks, said that when he looked back on the sixteen years he had been in that service, one fact stood out clearly in his mind, and that was the unfailing kindness he had received from the members of the Department—kindness which had reached its culminating point that night. When he thought how he entered the service a raw youth nineteen years of age, inexperienced in the ways of men, he looked back with gratitude on the way in which he was received at Dalmarnock. One thing he would say about the great, noble, generous-hearted City of Glasgow, which was that when a newcomer came into the city, only two questions seemed to be asked of him—first, "Are you willing to work hard?" and, second, "Are you willing to behave decently?" These questions answered in the affirmative, then kindness and a fair field were the order of the day. It was for this reason that he loved the city even more than the old town which gave him birth. The charm of the broad-minded outlook on life in Glasgow appealed very strongly to one who had been bred in the country. His old chief, Mr. Manwell, whom they all knew so well, used to say to him: "I wonder at you sticking to gas making. Why do you not strike out into a better line?" Well, he was more firmly wedded to gas making to-day than he had ever been. He did not contemplate gas manufacture when he started in life—when he entered the City Analyst's laboratory. Probably if he had, an easier and a cheaper means of arriving at a managership might have opened. However, there was a divinity which shaped their ends; and here he now was. Mr. M'Leod went on to give some reminiscences of his life in the laboratories of the Gas Department, and concluded by again thanking all present, from the bottom of his heart, for the encouragement they gave him in his going forward in the battle of life.

Mr. J. LOWE proposed the health of Mr. M'Leod, which was cordially pledged.

A long and excellent programme of music was gone through.

NEW RETORT-HOUSE FOR THE OTAGO GAS-WORKS.

We learn, from a copy of the "Otago Daily Times" just to hand, that the first pile of the foundations for the new retort-house and coal-stores for the Corporation Gas-Works was driven on the 27th of February, in the presence of the Mayor (Mr. G. Lawrence) and members of the Corporation, the Town Clerk (Mr. Richards), the Gas Manager (Mr. J. Hungerford), and the Contractor (Mr. A. Bain). There was no ceremony. The pile was driven to the required depth in about ten minutes.

The Chairman of the Gas Committee (Mr. Walker) explained to the visitors the reason for the gathering, and spoke in complimentary terms of Mr. English (the Consulting Engineer to the Corporation), under whose advice they were working, and of Mr. Hungerford, who had carried on the works most successfully and profitably. He said that the works were purchased by the Corporation on Jan. 1, 1876, at a cost of £49,400, and their present book value was £106,450. The total number of consumers was 4554, of public lamps 567, of men employed 71. The make of gas in 1906 was 129,634,000 cubic feet—an increase of 9 millions over the previous year. The net profit for 1906 was £7358. The net price of gas in 1876 was 12s. 6d. per 1000 cubic feet; whereas the present prices were 5s. 10d. and 5s. The profits transferred to the municipal department up to the 31st of March, 1906, amounted to £31,220; and there was a further sum of £2000. The credit balance at the bank was £17,000. It had been the cry of newspaper writers that the Corporation were losing money; but he contended that the gas-works were one of the best paying things the Corporation had at present, and they could be made to double their output with little additional expense. He did not think they had anything to fear from the electric light. The Mayor said that for a considerable time before he held his present position he had recognized that the gas-works were not in the best organized state. Since he had been in the chair he had made it his business to set about effecting improvements; and he was happy to say that the condition of the works had been improved. A result of the reorganization was that they were making an extra profit of anything from £9000 to £12,000 per annum on the whole system. He believed that the present erection was another step in the direction of improving the works, and that they would be of far more benefit than they had been, not only in producing better gas, but in enabling it to be supplied more cheaply. The Contractor, at whose invitation the Mayor and Councillors were present, briefly thanked them for their attendance, and stated that the pile had cut into it the names of the Mayor, the Chairman of the Gas Committee, the Town Clerk, and the Gas Manager.

NOTTINGHAM GAS INQUIRY.

Eighth Day's Proceedings.

The Committee of the Nottingham City Council appointed to inquire into the working of the gas undertaking during the past five years, met again on Friday for the first time since Easter. The members of the Committee are: The Mayor (Alderman J. A. H. Green), Mr. E. L. Manning, Mr. S. Cook, Mr. E. N. Elborne, and Dr. Dabell.

Mr. *J. H Brown*, at the outset, on the invitation of the Mayor, dealt at some length with the statements made by Mr. Harlow at the time he resigned the chairmanship of the Gas Committee. Referring to the paper he read before the Institution of Gas Engineers, and which Mr. Harlow had said "involved an enormous amount of time and trouble," he explained that the time and trouble were expended by the laboratory assistants, one of whom was getting 12s. a week, another 18s., and the third 22s. When these assistants were appointed, it was put to the Committee that they were to assist in experiments with regard to the water-gas plant. As the experiments had to be continuous, the Committee authorized the payment of 15s. a week extra to the assistants, so that they might live practically on the works during the time the experiments were being made. The actual experiments only occupied a period of four or five weeks. He entered upon them with a view to doing good to the undertaking; and it was not until the end of them that it occurred to him to read a paper on the subject. His own work had been done out of office hours.

The MAYOR: Then Mr. Harlow said that towards the end of November, 1905, the attention of the Council was called to the inferior quality of the gas; and the Chairman of the Committee asked the Engineer to draw up a report on the whole question, and advise what steps should be taken to remedy the state of things that existed; and the Engineer presented a report advising certain alterations in order that complaints might be made to his own department.

Witness asserted that no request was made to him; and they would find no reference on the minutes. He was having great difficulty with the complaints, and told Mr. Harlow they could not go on any longer than five days. Having experienced all this difficulty, and feeling that things were being unsatisfactorily worked, he hoped the Committee might see their way to put the matter on a satisfactory basis.

Then did Mr. Harlow, either in the committee-room or out of it, request you to give any report with reference to the complaints?—None whatever. He had previously been with me to a particular factory whence serious complaints had come; and when we got to the factory, and I showed him the cause of the complaints, he was perfectly satisfied with my explanation.

Then Mr. Harlow refers to a meeting on Dec. 8, at which you were instructed to supply gas of not less than 16-candle power, to use no water gas, and to make no experiments as to manufacture without definite authority from the Committee—adding that the Engineer was much upset at the decision of the Committee, and on the evening of the same day made the discovery at Eastcroft?—No experiments had been carried out for months before that. Naturally, I was concerned at the Committee altering their instructions with regard to the candle power under such circumstances. I felt that it was a retrograde movement to increase the candle power of the gas.

However upset you may have been at the decision of the Committee, the fact of you making the discovery at Eastcroft on the same day had nothing to do with the Committee meeting?—Nothing whatever.

How soon did you report to Mr. Harlow the discovery you had made?—I got to know about it at 1 a.m.; and the following morning at 9 o'clock I put myself in communication with the Chairman, and asked him to meet me at the office with those against whom the complaints were made.

Mr. Harlow says: "Previous to this, and on several occasions, I inquired of the Engineer if he thought he had enemies in the works who were tampering with the make or with the governors; and on one occasion at least I mentioned that I had received private information that the gas was being tampered with at the Eastcroft works. The Engineer assured me that it would be impossible for such a thing to occur, as he would at once detect anything of the kind?"—The Chairman certainly had asked me a question as to whether I had any enemies at some of the works; but no mention of Eastcroft was made, as far as I am aware. With regard to the latter part of the statement, as to being able to detect the alteration of the gas, it was obvious that, if the gas was tested every hour as it left the works, if there was any interference with the gas except on the part of the Superintendent Manager and the two foremen, it would be at once discovered. We had every reason to believe that these people were perfectly honest and candid in their returns; and every reasonable precaution was taken to check them.

Mr. Harlow goes on to say that the works at Eastcroft were in charge of the nominee of the Engineer. What have you to say to that?—The vacancy was duly advertised; and I recommended the man who was eventually appointed Superintendent. To that extent, the statement is correct. The man came before the Sub-Committee; and they engaged him at a salary of £250 per annum. There was an understanding that in the event of the returns at Eastcroft being satisfactory the salary would be increased.

I see that on March 16, 1906, the Committee resolved that the persons concerned in the misdoings were not to remain, but that he (the Superintendent) remained until July. Do you know why that was so?—The minute was passed, I know; but I was instructed not to act upon it. There was a general understanding.

Did Mr. Harlow ask or advise you to tender your resignation?—Yes, on March 9. I went to see the Chairman with regard to the report which was handed to the Gas Chairman three months before; and he made a long statement to me with regard to various matters. Seeing the vital importance of it, I took elaborate notes myself.

Was any promise given by you that you would tender your resignation in any particular event?—Yes. Let me explain. The statement by the Chairman was that he was perfectly satisfied with regard to the commercial work and my personal integrity, and my devotion to business management or chemical work, and everything else, with the sole exception of technicalities. He stated that he himself was not a

technical man. He was a business man; and he had looked into the business management of the undertaking, and expressed himself as more than satisfied. But with regard to technical matters, he said that there were some members of the Sub-Committee who understood these things; and they were dissatisfied with my technical ability. That was the ground of complaint. Several cases were enumerated, to each one of which I thought I had a perfectly satisfactory answer. I said to him: "If you are satisfied with my commercial management and my attention to business, and the only dispute is as to technical ability, the obvious thing to do is to call in some expert." I said that, as we were acting under the advice of Sir George Livesey, the fairest method to adopt was to call in Sir George Livesey. I was quite willing for him to call in any recognized expert he liked; and if that expert reported against me on these technical matters, I would hand in my resignation immediately.

Continuing, witness said that he afterwards demanded to see Sir George Livesey's report before he handed in his resignation; and upon the Chairman refusing to let him read the report, he also refused to hand in his resignation. The late Chairman asked him to resign his position without consulting the Committee; and he personally thought it was a most unreasonable thing to suggest that he should resign before knowing whether the report of the expert was favourable or not. He took it that Sir George Livesey's report had justified him throughout.

The MAYOR later on returned to Sir George Livesey's original report. Sir George, he said, had been very critical about the numerous varieties of coal that were being used; and he complained (or rather criticized) that there were no fewer than 22 collieries sending coal to the works. He saw, however, that according to the report in 1906 they were apparently getting coal from 16 or 17 collieries.

Witness replied that the number of collieries had been considerably reduced. Casual buying was preferable to contracts, as by purchasing large quantities at one time from a colliery, they were able to obtain more favourable terms. At present, Nottingham coal cost 2·28d. per 1000 cubic feet of gas more than at Sheffield; and residuals realized 2·33d. less. Thus Nottingham had to pay 4·6d. per 1000 cubic feet more than Sheffield.

The MAYOR: What strikes me as extraordinary is that before 1893 we were buying cheaper than at Sheffield; and since then we have had to pay more. Continuing, he said that, coming to Sir George's report of 1906, with reference to coal contracts, it appeared that Nottingham had been taking 65,000 tons of Yorkshire coal, 75,000 tons of Derbyshire coal, and 60,000 tons of Nottinghamshire cannel. It appeared that the yield of gas from Yorkshire coal was, roughly, 7 per cent. more than that from Derbyshire coal; but the Yorkshire coal was 25 per cent. dearer, which suggested that it would be cheaper to use Derbyshire coal than Yorkshire.

Witness said that this would appear to be the case; but there were several considerations. If they were to use more Derbyshire coal, the coke would be practically unsaleable; and there was a limit to the amount of enrichment they could give the gas by the use of cannel. If they were to abandon the Yorkshire coal, they would lose more on the sale of the coke than they would gain in the purchase. Were it possible to use the carburetted water-gas plant, they could employ a great deal of Derbyshire coal.

Replying to Mr. Cook, witness said that the blue water-gas plant had been tried for a sufficiently long period to show that it would be a complete success. He would rather not say why its use was discontinued by the Committee.

The MAYOR suggested that the Gas Committee were in a panic before the discoveries were made at Eastcroft; and since then no further steps had been taken.

The inquiry was adjourned until next Friday.

SOUTH METROPOLITAN COMPANY'S ACCIDENT FUND.

The Workmen's Compensation Act and Contracting Out.

In the South Metropolitan Gas Company's "Co-Partnership Journal" for the current month, Sir George Livesey offers some remarks on the above subjects. After pointing out that one of the good results of the Company's co-partnership system is the co-operation of officers, foremen, and workmen for the prevention of accidents, he says: "Since the starting of our contracting-out scheme nine years ago, there has been a great and remarkable fall in the number of accidents—from 69 per 1000 men employed in 1898, to 34 per 1000 men in 1906, or less than half. The total number of accidents in 1906 with 6079 men was 203 (two unhappily fatal); whereas if the proportion of 1898 had been continued, the number would have been about 410. What does the saving of over 200 accidents in the year mean in the prevention of suffering, pain, and loss? The system, which we were the first in this country to adopt, of having every accident investigated by a jury of twelve workmen, which is an outcome of our co-partnership, has greatly promoted the co-operation of all for the prevention of accidents. For the information of others, it may be stated that the jury list contains the names of all the workmen, who take turns as jurymen; every jury being composed of different men, which tends to make them all alive to the necessity for carefulness, and gives them the opportunity of making suggestions, which are always welcome, for safety in working. Half the accidents were slight, and only incapacitated, on the average, for 6½ days. A great help to quick recovery and the prevention of suffering is the first aid rendered by our large body of devoted ambulance men. Our thanks are heartily given to them for their ready help and kind and skilful attention. The subscriptions of 2d. per month by each man, and double that amount by the Company, have been for the last two years more than sufficient to meet all claims for accidents, including pensions to widows. The surplus last year was £337 10s., and the new year began with a balance of £814 8s. 4d. in hand."

Sir George also refers to the new Workmen's Compensation Act, which comes into operation on the 1st of July next, and points out that it puts an end to the Company's contracting-out scheme. Consequently, if the workmen think it desirable to continue the system which has worked so satisfactorily, it will be necessary to apply to the Chief Registrar of Friendly Societies for a renewal, with possibly some alterations. He says: "A determined effort was made by the Trade Union members of Parliament to prohibit contracting-out. I was present in the House of Commons when the question was discussed, and heard the motion for the abolition of contracting-out moved, seconded, and supported. On this point, Mr. Gladstone, the Home Secretary, was quite firm; and to him is due the fact that employers and employed are still to be allowed to continue these beneficial friendly arrangements. The Independent Labour Party, consisting of the Socialist Trade Unionists in the House, having failed to get contracting-out prohibited, tried so to word the contracting-out clause as to make it unworkable. After some trouble, however, it was eventually put into workable form. The only reason I can conceive for this determined opposition of these Trade Union Members of Parliament is that they object to everything that tends to bring employers and employed into friendly association."

LIGHT RAILWAY FOR A GAS COMPANY.

A Scheme at Harrogate.

There was held last week an extraordinary meeting of the Harrogate Gas Gompany, for the purpose of securing the approval of the proprietors to a scheme for the construction of a railway from the Bilton siding to the gas-works in Ripon Road.

The proposal was explained by the Chairman (Mr. F. Barber), who gave a short history of the difficulties connected with the haulage of the Company's large and increasing traffic over the roads, and the hostility provoked among the residents in the district through which it passed. The whole difficulty, he pointed out, was due to the primary mistake of erecting the works at a distance from the railway; and the desire to correct this initial blunder had increased as the traffic became greater. In 1897, the Directors approached the North-Eastern Railway Company, and requested them to construct a branch line to the populous district in the vicinity of the works; and upon their refusal to entertain such a scheme, the Board consulted a well-known engineer, who recommended a broad-gauge railway to deal with the whole of the traffic of the locality from the main line. The cost of the scheme, however, when regarded from the standpoint of the Company's traffic only, was prohibitive. The difficulty of getting the railway to the works appearing insuperable, the Board then considered the advisability of taking the works to the railway. Mr. Thomas Newbigging was consulted; and after making a careful examination of the sites along the railway, he recommended entirely new works, and the utilization of the existing site for storage purposes. The initial cost of the works of the necessary capacity was £56,620; but this sum by no means represented the cost to the Company, as the scheme involved the ultimate abandonment of the existing works, with the consequent loss of capital, and meant in all probability a serious parliamentary struggle with the adjoining property owners. The minds of the Directors, therefore, reverted to better means of transit between the railway and the Company's works. In 1904, by the courtesy of the then Chairman of the Corporation Water Committee, the Board viewed the light railway constructed for the conveyance of material from Masham Station to Roundhills reservoir—a distance of about 8 miles; and they were so favourably impressed by the apparent efficiency of its working, and the economy effected in the cost of haulage, that they at once consulted Mr. E. W. Dixon, the Engineer of it, as to the feasibility of connecting the Company's works with the railway in a similar manner. The line would be 1½ miles in length, starting at Bilton Junction; and the traffic was to be dealt with by a locomotive constructed to haul 30 tons up the maximum incline of 1 in 20·5, in light steel waggons built upon the high-capacity principle now adopted for main-line traffic. A special stage was to be provided at Bilton siding, on to which bogies carrying tanks for the tar and liquor could be run, and the tar and liquor thence discharged by gravitation into the tanks of the Railway Company. The scheme was designed to accommodate an annual traffic of 100,000 tons. The advantages and economy claimed were that the constantly recurring trouble with the road authorities and the residents in the district through which the traffic at present passed would be entirely removed, the Company would be placed in sole control of their own communication with the railway, and an immediate saving in the cost of haulage would be effected, which would result in further saving as the traffic increased in bulk. The Corporation were entitled to have their coal for the electric light works conveyed over the proposed railway.

A resolution was passed authorizing the Directors to carry out the proposal; and the raising of additional capital was sanctioned.

Consolidated Water-Works Company of Rosario, Limited.—The twelfth ordinary general meeting of this Company was held last Wednesday week, at the London Offices, Moorgate Street—Mr. W. T. Western presiding. In moving the adoption of the report for the past year, the Chairman stated that the period under review had been one of remarkable progress, and the receipts had risen, by about 13¾ per cent., to a total of £61,600. On the other hand, the works costs had been larger by only £2000—an advance equal to 8 per cent., of which rather more than half was for wages and the remainder practically for fuel. To enable them to meet the growing demands upon them, more pumps and other plant had been sent out, and 16 miles of distributing pipes had been laid. New share capital amounting to £45,000 had been issued. The quality of the water supplied by the Company had been uniformly satisfactory. The balance carried to the net revenue account was £37,582. After deducting debenture stock interest and charges, paying interim dividends of 3 per cent. on the preference and ordinary shares, placing £3163 to reserve fund, and £5000 to the contingency fund, there was left £12,852. It was proposed to pay final dividends of 3 per cent. on the preference shares and of 4 per cent. on the ordinary shares, and to carrry forward £2652 to the ordinary share dividend account. Mr. Isaac seconded the motion, and it was agreed to.

AN ACCOUNTANT ON DEPRECIATION.

At a recent Meeting of the Chartered Accountant Students' Society of London, a lecture on "Depreciation, with Special Reference to the Accounts of Local Authorities," was delivered by Professor LAWRENCE R. DICKSEE, M.Com., F.C.A. The author has sent us a print of his lecture, which he has delivered before Accountant Students' Societies in various parts of the country; and it will be seen from the following extracts, that he has treated the subject purely from a scientific point of view.

At the outset, the lecturer directed the attention of his audience to the importance attaching to the subject, because while, on the one hand, the finances of local authorities are asserted to be in an "absolutely rotten" condition, on the other it has been urged that so long as the authorities comply with their statutory requirements, and set aside annually out of their revenue a certain amount to form a sinking fund to provide for the eventual repayment of their loan capital, they have done all that is necessary, and even more than is attempted in most proprietary businesses. He promised in his lecture to steer clear of both extremes, and to furnish some arguments in favour of the middle course which he thought should be pursued. He then proceeded to consider his subject, and began by explaining the term "depreciation" as meaning the loss or shrinkage in value that inevitably occurs from time to time in the assets which represent the capital equipment of a business, as a result of their employment therein; this loss being attributable to wear and tear, lapse of time, the march of modern invention, or to any or all of these causes combined. He pointed out that this shrinkage in value must be looked upon as a working expense of the business, in just the same way that the hire of the assets would have to be regarded if the use of them had merely been acquired for short periods, instead of capital having been expended in the acquisition of them. There are many different methods of computing the amount to be annually charged in the accounts, as depreciation, to cover this necessary and expected shrinkage in value. This is the ordinary and accepted view of depreciation as held by accountants and all business men who have come under their influence; but the lecturer said he did not think we ought for this reason to assume that it is a view which is necessarily enforceable against local authorities. At all events, no such assumption appears to be generally admitted; for many at least of those who claim to speak on behalf of these authorities urge that their constitution is such that they are not bound by rules and formulæ which it may be desirable, or even necessary, for ordinary individuals to observe. He therefore thought it advisable to endeavour, by inquiry into first principles, to arrive at some natural law which must admittedly be binding upon local authorities as much as upon proprietary undertakings.

Professor Dicksee then went on to say that if we search for such a root-principle as that to which he had referred, we shall find that it lies not very far from the idea which is at the back of every lawyer's head when considering questions of account, and which has so often proved incomprehensible to laymen—viz., that in its essence an account ought always to be capable of being resolved into a statement of receipts and payments in money, and would in all cases so resolve itself if we were content to wait for an account until the undertaking had been brought to an end. Regarded from this point of view, all payments are a charge against profits, and all receipts (other than those representing the original capital embarked in the undertaking, and any subsequent additions to it) are to be regarded as profits, which, after payment of the necessary disbursements, represent the net profit of the venture. If there were no necessity to prepare an account of profits until the undertaking had been completed and finally liquidated, this is the basis that we should doubtless all employ by preference; and it is only owing to the need—a need recognized by every business man—to be supplied with interim accounts at fairly frequent intervals, that we have evolved what may be called the "revenue basis" as opposed to the "cash basis" of accounts. In the preparation of a revenue account, designed to show the profits earned up to a particular date during the continuance of an undertaking, it is necessary to bear in mind, *inter alia*, that certain expenditure which will ultimately be chargeable against profits cannot for the time being be fairly so charged, because the full benefit of the expenditure has not been yet received, and further benefits may be reasonably expected to be received from the expenditure in subsequent years. Out of this circumstance has grown the practice of "capitalizing" certain expenditure which will result in benefits being continuously received over a considerable period of time. The lecturer considered the practice to be undoubtedly fair as between one year and another, and even necessary to enable one to arrive at a reasonable estimate of the profits up to date. But this interim estimate of profits is, in the nature of things, compiled upon the assumption that the benefits to be derived in the future from the expenditure which has been held in suspense (or capitalized) will be equal to the estimate we have formed of those benefits. To guard against serious errors of estimate under this heading, the Legislature has provided, in respect of certain classes of undertakings—railways and proprietary gas-works, for example—that all expenditure upon the renewal of assets represented by expenditure that has been capitalized (or held in suspense) shall be charged against revenue; so that, at all events by the time an asset is discarded, a sum equal to its original cost, or the cost of replacing it by another asset equally efficient, shall be charged against revenue, and thus the proper charge shall be borne by the revenue of a series of years, even though there may be inequalities in the apportionment of the charge as between one year and another in the series. Bearing in mind the extreme difficulty of framing these estimates, this is probably as far as it would be practicable for the Legislature to go in such matters. At the same time it is clear that when the accounting parties desire to produce annual, or other short period, accounts which will, as nearly as possible, show the true results of each period's working, it is frequently necessary to provide in advance something towards the cost of renewing assets, in order to avoid serious inequalities in the apparent profits shown by those accounts, which are represented by no corresponding fluctuations in the amount of profitable business actually done. In this way the custom has grown up among prudent business men of setting aside a provision for depreciation, which is the same thing as providing for the future cost of renewals, from the very first year in which the various capital assets are used, instead of waiting until such assets are discarded, and then charging a lump sum as representing the whole of the cost of such assets then written off against profits, in which event the whole of such cost of renewal would be charged against the profits of one year, though the benefit derived from their use had been received during many years.

Taking the principles he had enumerated as representing the basis upon which it is necessary that provision for depreciation of wasting assets should in all cases be provided, the lecturer thought he was on safe and uncontroversial ground, and might next proceed to consider the problem as applied to local authorities. This he did as follows: The trading departments of local authorities differ from ordinary business undertakings in this somewhat material respect, that the Legislature, having foreseen that the various assets they would acquire as a result of capital expenditure would, in the majority of cases, not last for ever, but only for a limited number of years, has stipulated that the moneys borrowed to enable a local authority to pay for such assets must also only be borrowed for a certain limited number of years; and that during this period provision must be regularly made, by way of a sinking fund, to enable a sufficient amount of money to be set aside, and accumulated at compound interest, to redeem the loan on the date it becomes repayable. The effect of this stipulation, that there must be no permanent debt, is, of course, that, assuming the working life of the assets in all cases exactly corresponds with the period for which the loan has been granted, the amount set aside out of revenue during the time these assets have been available for use as revenue-producers will exactly equal the whole of their cost. Consequently, though there may be minor errors with regard to the apportionment as between one year and another, the charge against revenue in respect of the sinking fund may, under these peculiar circumstances, be regarded as being the statutory equivalent for, and as taking the place of, the ordinary business man's charge for depreciation of assets. The sinking fund instalment, however, can only be regarded as equivalent to depreciation in those cases where the working life of each separate asset is exactly equal to the loan period.

The lecturer pointed out that this was a matter frequently lost sight of in practice, and was of the very greatest importance, as he next proceeded to show. He remarked that when a local authority apply for leave to issue a loan, they have to submit estimates of the proposed expenditure to the Local Government Board; and upon these being approved, the loan is sanctioned for a term which, in the opinion of the Board's officials, represents the average life of the assets that will be acquired out of the proceeds of the loan. Assuming that the loan period exactly equals the average life, it must be borne in mind that the various assets proposed to be acquired will, in all normal cases, be anything but uniform in character; and that thus there will be a very marked discrepancy between the loan period and the estimated life of almost each one of the several classes of assets proposed to be acquired, while, of course, there will be still further variations between individual items of assets of the same kind. In order to make this point quite clear, he submitted the following table, showing approximately how the expenditure on a municipal electric lighting works would probably be divided as between different classes of assets—the estimated working life of each class of asset, its estimated residual value, and its effective working life, taking the residual value into account. From these particulars, it will be seen that the average effective life of the undertaking as a whole works out as nearly as possible at 48¾ years; and upon this basis a loan would in all probability be granted for 48 years, or thereabouts. But, upon comparing the loan period with the column showing the effective life of each class of asset, it will be found that in no single instance do the two correspond. In some cases the working life is very considerably greater, while in others it is very considerably less; and in no single instance is it even approximately the same.

Class of Asset.	Estimated Life.	Residual Value.	Effective Life.	Amount of Expenditure.
	Years.	Per Cent.	Years.	Per Cent.
Land	100	..	100	4·00
Buildings	80	..	80	14·00
Foundations	100	..	100	10·00
Boilers	25	5	26·3	5·50
Dynamos	30	8	32·3	6·00
Engines and machinery	25	6	26·6	21·50
Cables	35	15	41·2	32·00
Arc lamps	12	5	12·6	1·20
Arc lamp posts	40	5	42·1	1·00
Accumulators	15	10	16·6	0·20
Motors	25	9	27·5	0·55
Office furniture	15	5	15·5	0·30
Meters	12	2	12·3	3·40
Accessories and instruments	12	2	12·3	0·15
Tools, &c.	10	5	10·5	0·20
				100·00

Average effective life 48·75 years.

Professor Dicksee stated that the case shown in the table, while being comparatively simple, had not been so simplified as to represent a position of affairs differing very greatly from that which he had reason to believe generally obtains. He pointed out that the shortest-lived asset on the list represented "Tools, &c.," which had an effective working life estimated at 10·5 years. It was true, he said, that this item represented only 0·2 per cent. of the capital expenditure, and that, therefore, any error that might be discovered in connection with it was practically a negligible quantity. But the general principle would apply equally well to all assets having an effective working life estimated at less than 48¾ years—that was to say, to the whole undertaking, with the exception of its lands, buildings, and foundations. Dealing further with this item, he said: With regard to tools, the

position is that at the end of about 10½ years, if our estimate of their working life proves true, they will require renewal. The cost of such renewal must to a large extent be then borne by revenue, because the rule of the Local Government Board is that whenever the renewal of an asset takes place, and provision has not been made for the repayment of the whole of the original cost thereof, a new loan will only be sanctioned to the extent to which provision has been actually made for such repayment On the 2¾ per cent. tables, a sinking fund of about 1 per cent. is necessary in order to provide for repayment at the end of 48¾ years, and at the end of ten years that fund will only have amounted to 11·33 per cent. Therefore, upon the scrapping of these tools at the end of ten years, 88 67 per cent. of the original cost must be charged against revenue. Now, it must, I think, be obvious that to charge 1 per cent. per annum for ten years, and then about 89 per cent. in the eleventh year, is not a fair or an equitable way of apportioning between those eleven years (or, to be accurate, 10½ years) the proper charge to represent the benefit derived by the undertaking during that period from the use of these particular assets. In this extreme case, it is clear that, in addition to the statutory sinking fund of 1 per cent. per annum, something like a further 8½ per cent. per annum ought to be charged as a reserve for renewals. Of course, in practice, it is not at all likely that all the tools will last for exactly the same period of time. Some may last more than 10½ years and some less; and yet 10½ years may represent the average life of this class of asset. . . Conversely, those assets which have an effective life longer than the loan period will remain in good working order after the loan has been entirely repaid; and in the case cited it will be seen that the first three items have an average working life of 90 years, or nearly double the authorized loan period. When, therefore, a 1 per cent. sinking fund is set aside in respect of these items, it represents something like four times as much as is necessary to make due provision for depreciation. But this excess cannot be made use of to supply a deficiency, for the simple reason that the Local Government Board will not allow moneys to be borrowed for renewal purposes to an extent exceeding the provision made for the repayment of that portion of the loan.

Dealing further with the question of renewals, the lecturer said: We cannot even go the length of saying "It will be all right a hundred years hence," for in one way or another—that is to say, either in lump sums as renewals take place, or reasonably equitably apportioned over the various years, if due provision be made for the contingency in advance—the cost of those renewals for which no borrowing is permitted will have to be borne by revenue; and, inasmuch as there is a further rule that borrowing is not allowed (save within somewhat narrow limits) in respect of expenditure that has already been incurred, it is not even possible to get straight again later on, when the original loan period expires. Thus, in any event, the statutory sinking fund will not suffice to keep the undertaking going. Further charges must be made against revenue, as representing part of the cost of the renewal of what we may, for convenience, call the "short-lived" assets. Thus, in spite of its avowed policy to merely maintain the *status quo*, the Local Government Board in practice requires local authorities to accumulate a certain amount of capital on their own account. This is, and must in all cases be, the inevitable result of an equated loan period. That being so, the only prudent course, it seems to me, is for each local authority to have a careful calculation made, and as a result thereof to compute the annual sum they ought to charge against revenue, in addition to the sinking fund, in order to equalize the expenditure that will necessarily be incurred on the renewal of these "short-lived" assets. Such a charge is sanctioned by the statutory provision usually obtaining, permitting the local authority to create a reserve fund not exceeding (usually) one-tenth of their aggregate capital expenditure for the time being. This limit, though no doubt fixed without any previous scientific inquiry, will, I think, be found adequate under all normal circumstances. But the so-called reserve fund—or, as I prefer to call it, reserve (for renewals) fund—should be built up systematically upon a basis computed by careful calculation, and not haphazard out of "surplus profits" when there are any. Then, when the necessity arises for renewals to be made for which no borrowing is permissible, the cost of such renewals may be borne by the fund; thus reducing it, and permitting further accumulations to be made out of revenue from time to time. This plan has already been adopted at my suggestion by the Electric Lighting Department of one local authority, and its advantages are, I think, sufficiently evident to encourage the hope that others will gradually fall into line, and adopt the same course. The advantages of so doing are, it seems to me, self-evident. It effectually sets at rest all doubt as to whether due provision for depreciation is, in point of fact, being made; and, by so doing, naturally increases the credit of the local authority, and improves the terms upon which they will be able to raise future loans. At the same time, by definitely ear-marking from year to year gross profits which in all fairness ought to be set aside to provide for future expenditure, it becomes possible to provide reasonable reserve for contingencies; thus avoiding the fatal policy of reducing prices to a level which it will be impossible to maintain in future years, when heavy expenditure for renewals has to be provided out of revenue because no borrowing powers can be obtained.

Before leaving his subject, the lecturer pointed out that, with but very slight sacrifice at the present time, material advantages might be secured in the future by gradually reducing the outstanding indebtedness of the various trading departments. In the present state of the law, the maximum reserve fund is usually 10 per cent. upon the capital expenditure; and this would probably be held to include the reserve necessary to equalize expenditure upon renewals. But, were this maximum to be abolished, an additional sinking fund of ½ per cent. per annum would entirely free an undertaking from debt in about 69 years; while a sinking fund of only 4s. per cent. per annum would produce the same effect in less than 100 years. Thus, at an almost imperceptible increase of current expenses, provision might be made for a material reduction in the indebtedness of local authorities at no very far distant date; and he could not help thinking that the increased charge upon the present generation of ratepayers would be almost immediately compensated for—and even more—by the more favourable terms on which local authorities would then be able to issue their loans. The mere fact that local indebtedness was decreasing, instead of growing, would greatly increase the competition for local stocks, and thus enable them to be issued at a higher price or at a lower rate of interest, or perhaps at both—a result which would very speedily compensate for an immediate expenditure of a few shillings per cent. per annum on the present amount of indebtedness.

Professor Dicksee remarked that this was, of course, outside the scope of his subject, and represented merely what might be done if the Legislature thought fit to extend the powers it now grants to local authorities; but as a problem in practical finance, it presented points of considerable interest, and was thus, he thought, well worthy of more careful consideration than it appeared at the present time to have received.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

As was the case at Peebles a year ago, the Waverley Association of Gas Managers bestowed their attention, at their meeting in Edinburgh on Friday, upon business other than technical work. They have adopted a constitution, with set rules and regulations, and an annual subscription; so that henceforth they will be more of an Association than they have been. The practice of holding meetings half yearly has been given up. In future there is to be one meeting only in the year—and preferably it is to be held in Edinburgh, as being the most convenient centre for the members. This is, perhaps, the greatest change of all, or the change which will have the most effect upon the well-being of the Association. There has not been time yet to learn how many members have enrolled in the ordinary and extraordinary classes; but the attendance on Friday was said to be the largest which has been experienced at any of the meetings of the Association in its pre-reconstruction period. This may be taken as an indication that the change is in accordance with the views of the gentlemen who have been in the habit of attending. The change would thus appear to be already justified by results. It now rests with the members to see that the interest thus created is sustained, and that the fortunes of the Waverley Association do not suffer by its business being placed upon a more strict footing than hitherto. The business transacted on Friday was not of an exacting nature, and was soon got through. The Committee appointed at the last meeting had done their work so well that there was nothing to question; and the constitution and rules were passed almost without comment. Having adopted means which are intended to open the way for a more strenuous existence in time to come, the Association adjourned and proceeded to the enjoyments provided for them. At the dinner the venerable Provost Smith, of Dunbar, who is reputed to be the oldest Gas Convener in Scotland, proposed the toast of the day, in appreciative terms. The company afterwards visited the Central Fire Station in Edinburgh and the Forth Bridge; being conveyed to and fro in motor omnibuses, provided by Mr. James M'Kelvie, of Edinburgh, who met the party at Queensferry, and spent an hour with them. Among incidents which may be worthy of note were the presence throughout the day of Mr. T. Douglas Hall, late Gas Manager at Montrose, now resident in Edinburgh, and the production, by Mr. H. Rutherford, of Aberlady, of the first drawing by the late Mr. William Young of a vertical gas-retort, executed by him at Musselburgh 36 years ago, and in which are the essential elements contained in the retort recently patented by Messrs. Young and Glover.

There was a long discussion in the Town Council of Edinburgh on Wednesday upon the subject of municipal trading. It was brought about by a recommendation by the Plans and Works Committee that the estimate of the Edinburgh and Leith Gas Commissioners, amounting to £10 7s. 2d., be accepted for the fitting up of the ladies' pond at the public baths with an installation of incandescent gas lighting. The next higher offer was by a firm of private traders, and amounted to £13 16s. In discussing the proposal, Mr. Lyon said he would not have approved of the Gas Commission contracting for ordinary business of this kind; but the Commission were practically a branch of the Corporation, and therefore this was just their own work. The question having been raised as to what was the practice in regard to electric light fittings, Bailie Stevenson, the Convener of the Electric Lighting Committee, explained that the electric fittings in the municipal buildings were put up by a contractor, and that when anything went wrong they were at first in the habit of sending for an outside man to repair it; but the work was not always satisfactorily done, and now a man from the electric station was employed, and the cost was charged to the city. After some further discussion, the Council divided, when 31 voted for the acceptance of the tender of the private firm, and 10 for that of the Gas Commission.

A very pleasant ceremony was carried through in Glasgow on Wednesday evening, when Mr. James M'Leod was presented by his former colleagues in the Glasgow Corporation Gas Department with valuable gifts, to mark their esteem for him on his leaving the city for Kirkintilloch. The spirit of loyalty to Mr. M'Leod was strongly evinced throughout the whole of the proceedings, justifying the anticipation that a similar state of matters will soon manifest itself in his new sphere, which, in turn, forms the best augury for the career of usefulness that is expected for Mr. M'Leod.

Gas matters bulked largely at the meeting of the Fraserburgh Town Council on Thursday. At the previous monthly meeting of the Council, permission was given to the Fraserburgh Gaslight Company to erect a gasholder at Mid Street. Bailie Robb on Thursday said that an idea had got abroad that the Company would have power to erect buildings for the manufacture of gas upon the site; but it was only the erection, of a gasholder that was sanctioned. Mr. Edward Gordon moved that the Council hold a special meeting for the adoption of the Burghs Gas Supply (Scotland) Act, 1876, to be followed up by the usual procedure. Mr. Anderson, the Convener of the Streets Committee, said he had no objection to the motion; but he thought it might be delayed till the Streets Committee had completed their investigations into the same subject and brought up their report. The taking over of the gas undertaking was a serious business, and would probably involve an expenditure of £18,000 or £19,000. Provost Finlayson pointed out that the motion took the matter out of the hands of the Streets Committee; and Mr. Gordon rejoined that the Committee had had twelve months

to consider it. Complaint was made by several members that Mr. Anderson had mentioned the figure he had, as it almost implied that something had been arranged. The Council, by 6 votes to 4, adopted Mr. Gordon's motion. Thereafter Mr. Anderson resigned his position as Convener of the Streets Committee.

Mr. T. O'Neil, the Manager of the Corporation Gas-Works at Dunbar, was on Wednesday evening, on the motion of Provost Smith, the Convener of the Gas Committee, unanimously voted an increase of £15 to his salary. This is understood to be intended to take the place of an honorarium which has been voted to him annually for some years.

In the Peebles Town Council on Tuesday, a discussion took place upon the use of tar macadam for road making. The Corporation a few years ago laid the whole of the footpaths within the burgh with concrete, thereby making the town one of the neatest to be seen anywhere. The proposal now is to make dustless roadways, which would be a further enhancement of the town in the eyes of visitors. Provost Sir Henry Ballantyne reported that a deputation of the Council had visited Glasgow, where they saw several methods of road construction, including tar macadam. The latter, he said, appeared to him to be very good. It would be necessary to have a gas-engine and stonebreaker at the old gas-works. He was told, however, that there were to be some experiments near London; and he thought they might wait a little, to see the result of these. What recommended tar macadam to him was its cheapness. It was mentioned that experiments were also being made at Cupar. The Council agreed to the suggestion that they should await the results of the experiments.

In an article which appeared in the "Dundee Advertiser" on Monday last, with the heading of "Under the Old Gas-Lamps," the writer dwells affectionately upon the appearance of the town when it was wholly lighted by flat-flame burners. Thus, he said: "There was, for one thing, the greater privacy of the streets, that were not, as now, almost glaringly illuminated. To use a simile, a stroll at night then, compared with the present, was like a quiet half hour in candle light, as contrasted with the crowded animation of an electrically-lit drawing-room. There was something modest-like about the old yellow lamps; they seemed to say: 'I'll just give you a peak to let you see along,' instead of flashing in your face and showing folks how your stud has come out. There is no sentiment about the incandescent. It has a vulgar, unfeeling way of throwing you into prominence; and the arc lamp is intolerable. I have the notion that we had better eyesight under the old gas-lamps." Thus do tastes differ.

A writer of "Motor Notes" in the "Scotsman" of Thursday of this week says: "The same incentive which was responsible for improving the quality of gas illumination when threatened by electricity—that of necessity—is being manifested in the case of motor fuel. The price of petrol has been going up at a rate which has made it necessary to look out for some efficient substitute. One of the latest competitors is benzol, which is very shortly to be put on sale as a motor fuel by a firm of tar distillers at 1s. to 1s. 3d. per gallon. Benzol has been found volatile enough to vaporize satisfactorily with a suitable carburettor. Numerous tests have been carried out with various qualities of benzol at different grades, and the impression has been left that benzol explodes even more efficiently in the cylinder than petrol. . . . An objection to the new fuel suggested is that the carbon deposit will be greater; but it is stated that experiments have shown that in suitable circumstances no fear need be entertained on this point. One of the advantages is that with benzol there is less danger from explosion. The fluctuation in price, which is a feature of this product, will be an element in its success. But as it has been found that, in spite of the increased use of electricity, the consumption of coal gas continues also to increase, there should be a corresponding increase in the production of benzol; and the increase should be greater from the fact that with a decreasing illuminating power required for coal gas, owing to the general use of mantles, more of the bye-product is likely to be available."

The Corporation of Arbroath have got into further trouble with Mr. Archibald Williamson, of Glenogil, regarding the taking of material for the construction of the reservoir upon Mr. Williamson's property. The complaint is that about 2000 tons of material have been taken, to which the Corporation had no right; and a summons for £500 has been served upon the Corporation in respect of this quantity. The service of the summons was intimated by the Town Clerk at the monthly meeting of the Town Council on Monday. Bailie Robertson, the Convener of the Water Committee, said they had been at loggerheads with Mr. Williamson all along; but things had taken a serious turn this time. Bailie Smith said there was no good in trying to compromise with Mr. Williamson. They had to fight him—a thing which they should have done from the start. It was also asserted that the statements appended to the summons were a tissue of inaccuracies; and the Council unanimously agreed to resist the claim. Instructions were given for the lodging of defences.

At a meeting of the Peterhead Corporation recently, a letter was read from Mr. Patrick Irvine, the Town Chamberlain, in which the writer stated that he had received a communication from the Under-Secretary for Scotland, pointing out that he was directed by the Secretary for Scotland to state that, in his view, the question of forming a depreciation or renewal fund, in accordance with section 41 of the Burghs Gas Supply (Scotland) Act, 1876, should receive the attention of the Town Council. He reminded the Council that a considerable proportion of the capital liabilities of the gas undertaking had been contracted in providing meters and gas-stoves, and that the redemption period for loans raised for such a purpose in England was usually limited to ten years; while the average redemption period for the Peterhead Gas Department was forty years. The Chamberlain said that it appeared to him that, before any steps could be taken to form a depreciation or renewal fund, it would be necessary to obtain a proper valuation of the works, machinery, and plant. The Town Council agreed, on the recommendation of the Gas Committee, with this proposal, and remitted to the Gas Convener to appoint a qualified valuer, and to have the valuation carried out.

A statement was made at a recent meeting of the Dunfermline District Committee by the Chairman—Mr. D. Alexander—regarding

THE WILSON GAS COOKERS

FITTED WITH

GAS AND AIR ADJUSTMENT,

AS ILLUSTRATED,

NO EXTRA CHARGE.

A Season in advance of all other Makers.

SEND FOR SAMPLE.

WILSONS & MATHIESONS, LTD.,

London Show-Rooms:
76, QUEEN STREET, CHEAPSIDE, E.C.

CARLTON WORKS, ARMLEY, LEEDS.

the difficulty that has been encountered in the construction of the dam for the Glenquay reservoir. The Contractors are James Young, Limited, of Glasgow. They have found it necessary to go to a depth of 200 feet, in order to get a sufficient foundation for the puddle wall; and, on account of this being a very much greater depth than was estimated for, they requested a revisal of the contract rates. This was agreed to; and a conference was held in Glasgow between the Contractors, the representatives of the District Committee, the Admiralty, the Town Council of Inverkeithing, and Sir W. R. Copland, of Glasgow, who is Consulting Engineer for the Glenquay scheme. As a result, it has been agreed to pay the Contractors at the rate of 170s. per cubic yard dealt with at the lowest depth. This will have the effect of raising the contract price from £34,094 to, it is estimated, £89,793. The total cost of the work was estimated originally at £104,000. Payments have already been made to the amount of £104,240; and it is now anticipated that the total cost will be £177,127.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *April* 13.

Sulphate of Ammonia.

There has again been a quiet market, demand being scarcely equal to available supply, and prices are a shade easier on the week. The closing quotations are £11 15s. per ton f.o.b. Hull, £11 16s. 3d. to £11 17s. 6d. per ton f.o.b. Liverpool, and £11 17s. 6d. per ton f.o.b. Leith. For delivery over the near months, the Continent is competing keenly, and business has been accepted at a discount on spot prices. For April-September, and for June-December, U.K. makers would accept £11 17s. 6d. per ton f.o.b., though in Scotland £12 per ton is generally quoted.

Nitrate of Soda.

This article is a shade easier on spot, and 11s. 4½d. per cwt. for 95 per cent. and 11s. 9d. for refined quality are the quotations.

LONDON, *April* 12.

Tar Products.

There has been very little of interest in the market during the past week. Pitch remains in about the same position. Small quantities continue to be bought from time to time on the east coast for delivery to June at fairly low figures, though for the best makes 26s. 3d. and 26s. 6d. are both reported as having been paid. In London, some of the makes could be bought at 25s. 6d. to 26s.; but the larger manufacturers are practically out of the market, though they would undoubtedly place some quantity if they were offered an advance on existing prices. Pitch has again been sold in Liverpool for delivery this side of June at 24s. 6d.; while in Glasgow, 25s. has been accepted for best gas pitch. For forward delivery, makers are not inclined to sell, and they quote prices very much in advance of the prompt figures ruling. Creosote is very firm, though prices are practically unchanged. London manufacturers ask 2⅜d. to 2½d., and the same figure is quoted in the Midlands; but in the North business has been done at 2d. to 2⅛d., according to locality and period of delivery. Benzol, 90 per cent., is still weak, and low prices are reported to have been accepted for delivery to the end of the year. Benzol, 50-90 per cent., is easier in sympathy; but the quantity of this quality available is but small, and there is more demand for it than for 90 per cent. Toluol is unchanged; and manufacturers have so little to spare that they are determined to get their price or carry same forward. Solvent naphtha is in about the same position. Actual London qualities are scarce; but country makes are selling freely, and prices are without difficulty maintained. Small sales are reported in anthracene from time to time at about existing prices. There is no alteration in the market for carbolic acid. English consumers refuse to offer more than 1s. 7d. at makers' works; while 1s. 8d. f.o.b. on the east coast is the limit of the Continental consumers. The market for crystals is very quiet; but there is no alteration in prices.

The average values during the week were: Tar, 14s. 3d. to 18s. 3d. Pitch, London, 25s. 6d. to 26s.; east coast, 25s. to 25s. 3d.; west coast, 24s. to 24s. 6d. Benzol, 90 per cent., 9½d. to 10½d.; 50-90 per cent., 10½d. to 11d. Toluol, 1s. 1½d. to 1s. 2½d. Crude naphtha, 4½d. to 5d.; solvent naphtha, 1s. 2d. to 1s. 3d.; heavy naphtha, 1s. 2d. to 1s. 4d. Creosote, London, 2⅜d.; North, 2d. to 2⅛d. Heavy oils, 2⅜d. to 2⅝d. Carbolic acid, 60 per cent., 1s. 8d. to 1s. 8½d. Naphthalene, £6 to £10; salts, 35s. to 40s. Anthracene, "A" quality, 1⅛d. to 1⅜d.

Sulphate of Ammonia.

The market remains in about the same position; and prices are really unchanged. The principal London Companies are practically out of the market for April delivery; but for May-June, they would accept £11 17s. 6d. on their own special terms. Outside makes, however, could be secured at under this figure. In Leith, £11 17s. 6d. has been accepted for a small quantity for prompt delivery. No business is reported in Hull, where the value may be taken as about £11 15s.; while in Liverpool, business is reported to have been done for prompt delivery in a good make at £11 16s. 3d.

Good Contract for the Wolverhampton Gas Company.—A paragraph recently appeared in the "Midland Counties Express" to the effect that the Wolverhampton Electricity Committee were making an effort to secure the contract for the supply of the new works of the Great Western Railway Company at Oxley. The contract, it need hardly be added, is a large one. Negotiations have been in progress some time; and at last Monday's meeting of the Wolverhampton Town Council it was mentioned that the Committee hoped to secure the contract. We learn, however, from the above-named paper, that the Company have decided that the new engine-shed and offices shall be lighted by gas to be supplied by the Wolverhampton Gas Company—the Railway Company putting in their own fittings, &c.

SAWER & PURVES,

MAKERS OF

COIN COLLECTING CONVEYANCES.

PAINTED AND LETTERED AS REQUIRED.

OVER 100 IN USE.

EXCELLENT FINISH.

EXTRA STRONG WHEELS.

FULL PARTICULARS ON APPLICATION.

"THE MODEL COIN COLLECTOR."

MILES PLATTING, MANCHESTER, & RADFORD ROAD, NOTTINGHAM.

COAL TRADE REPORTS.

Lancashire Coal Trade.

The general conditions of the Lancashire coal trade show no material variation from last week's report. The all-round demand is above the average at this period of the year; but for domestic requirements, there is a falling off. Engine fuel is in strong request. Slack is likely to be dearer as the summer advances. Shipping trade is good. Gas coal and cannel are in fair demand at increased prices. Should a Miners' Eight Hours Bill become law, it will be equivalent to a rise in wages. Coal will then be dearer. A good deal of Yorkshire coal is being exported. The arrivals at Holland from Hull and Grimsby are largely in excess of last year's tonnage. The average quotations on the Manchester Coal Exchange are: Best house coal 14s. 6d. to 15s. 6d., secondary 13s. 6d. to 14s., common 10s. 6d. to 12s. 6d., burgy 8s. 10d. to 9s. 6d., best slack 8s. to 9s., medium 7s. to 8s., low qualities 6s. 6d. to 6s. 9d., coal for shipping 12s. to 13s., f.o.b. Garston. Furnace coke 17s. to 24s.

Northern Coal Trade.

Though there has been an occasional interruption, the coal trade of the North is generally active, and the shipments have been full, so that most of the collieries have had full work, and some seem to be well sold forward. In the steam coal trade, best Northumbrians are quoted at 15s. per ton f.o.b., for second-class steams the price varies from about 13s. 9d. to 14s. 6d., and steam smalls are from 9s. to 10s., according to conditions and quality—small steams being relatively high through the enlarged demand. In the gas coal trade, the request is full for this time of the year, and the large output is well taken up, though there are lessened quantities delivered under the heavy Metropolitan contracts that are still running. The exports, however, are now increased, and seem likely to be further enlarged. Durham gas coals are still quoted from about 12s. to 13s. 3d. per ton f.o.b., according to the quality. As to the new contracts that are believed to be in negotiation, there is little to say, though there are rumours that an agreement has been come to with one of the best of the gas coal collieries. Probably next week something official may be ascertained. In the meantime, the Danish Gas Company is in the market also for 110,000 tons, for this year. The coke trade is firmer; and gas coke, being in less supply, is also firm. Good gas coke, f.o.b., is quoted from 14s. 9d. to 15s. 6d. per ton, and is not very plentiful at the Teeside works.

Scotch Coal Trade.

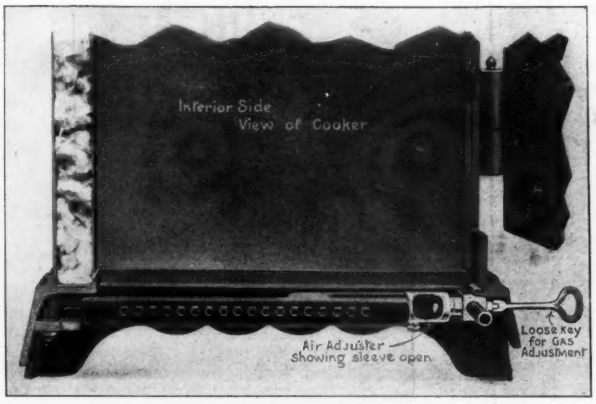
Trade remains unchanged in aspect, the trend of prices being still upwards, and likely to be so for some time yet. Outputs are being fully taken up; and small coal, for manufacturing purposes, is in such demand for shipping that it is scarcely procurable at home. The prices quoted are: Ell, 12s. 3d. to 13s. 9d. per ton f.o.b. Glasgow; splint 13s. to 13s. 3d.; and steam 11s. 9d. to 12s. The shipments for the week amounted to 303,427 tons—an increase of 8049 tons upon the preceding week, and of 34,573 tons upon the same week of last year. For the year to date, the total shipments have been 3,447,462 tons—an increase of 197,389 tons upon the corresponding period of 1906.

A New Gas-Mantle Factory at Derby.

Readers will be interested to learn that Messrs. Henry Hill and Co., Limited, the patentees and manufacturers of the "Hill-light" mantles, are erecting an incandescent mantle factory at Derby, which will, we are informed, be one of the most efficient in existence, for the supply of their goods to the British market. This is an entirely English firm, whose registered offices are No. 63, MansfieldRoad, Nottingham; but, through a peculiar complication of circumstances, they have never manufactured their mantles in this country, though the knitting forming the foundation is the invention of Mr. Henry Hill, of Messrs. Balm, Hill, and Sons, an old Nottingham lace-making firm, and has been manufactured in Nottingham. The finished mantles have up to the present time been made on the Continent only, while for the British, United States, and Australian markets the exclusive use of Mr. Hill's patent knitting has been in the hands of the respective Welsbach Companies—the knitting forming the base of the English Welsbach Company's speciality marked "CX." Now, however, this peculiar state of things, which has for some time been a source of inconvenience to Messrs. Henry Hill and Co.'s British customers, has come to an end. The management of the Derby factory will be in the hands of Mr. H. White Thompson, who has been in the service of the Company on the Continent for a considerable time; the general management remaining, as before, with Mr. Edgar H. Hill and Mr. Joseph Hirsch, who have conducted the business since its foundation in 1899.

Castlewellan Water Supply.—A Local Government Board inquiry has lately been held at Castlewellan, by Mr. A. D. Price, concerning an application by the Downpatrick Rural District Council for sanction to a loan of £4000 for the purpose of providing a water supply for the town of Castlewellan—the area of charge to be Castlewellan and Dundrine. The scheme was explained by the Engineer, Mr. J. E. Croasdaile; while the application was opposed by Earl Annesley and several ratepayers.

Death from Coal-Gas Poisoning.—Mrs. Rouse, of Liversedge, was some days ago found by her daughter lying on the kitchen floor; there being a big escape of gas through a pipe from which a gas-bracket had been torn. Artificial respiration was tried for an hour; but it was of no avail. It was stated at the inquest that deceased had been using a heavy gas-iron, which was connected with the bracket by means of a metallic tube; and it was suggested that, while drawing the iron backwards and forwards on the table, the bracket was torn out, and the unfortunate woman was overcome by the escaping gas.



Wright's New

GAS and AIR ADJUSTMENT

for their celebrated

"EUREKA" GAS COOKERS.

THE accompanying illustration shows the simple manner of adjusting both Gas and Air to the Oven Burners.

BOTH Gas and Air can be adjusted while the Burner is alight.

THESE Adjustors can be easily fitted to any of our Cookers which Gas Authorities may have in Stock.

JOHN WRIGHT & CO.,
BIRMINGHAM.

Shortsightedness of "High Prices to Relieve Rates" Policy.

Mr. T. G. Marsh has written to the "Manchester Courier" on the subject of the allocation of £13,000 of the gas profits at Stockport in relief of the rates, to which reference was made in the "JOURNAL" last week (p. 115). Referring to the retort by the Chairman of the Gas Committee, in answer to a criticism of their policy, that "the sun shines on the just as well as on the unjust," Mr. Marsh says the Chairman cannot have referred to large towns, for the veil of smoke seldom allows either the just or the unjust to enjoy the sun's rays. He considers that the policy of gas monopolists in charging excessive prices is not only unjust but shortsighted. He says: "They are strangling the industry which they should support; they are preventing its expansion, and are deterring manufacturers from installing gas in place of solid fuel furnaces. Gas committees are not, as in the past, simply vendors of light; they are sellers of light, of heat, and of power. In considering their scale of charges, they should, in all fairness, take into account the fact that the cost of light has been reduced fully 70 per cent. by the introduction of incandescent gas lighting, and that the consumers, whose turn it is now to be considered, are those who might adopt gas for purposes other than lighting. The cost of gas plant extensions, when required for heat and for power, is one-fourth the cost of plant needed for lighting gas; this is consequent on the more regular load demanded. Sanitary committees might well advocate the sale of cheap gas for heating purposes. The expenditure of their committees, now due largely to the foul smoke and sulphurous atmosphere, would be reduced to such an extent that the rates of the general public would be lowered by this means alone as much as by the using of gas profits, while the gas consumers would benefit alike from reduced prices and healthier surroundings." Mr. Marsh points out that this "window dressing" of gas profits will cost the Stockport Gas Committee £650 in income-tax. He thinks the price of gas ought to be differentiated, and says municipal enterprise is being discredited. A private concern would endeavour to fix their prices so as to compete favourably with solid fuel.

Corporations as Colliery Owners.—The Batley Town Council have rejected a motion by Alderman Turner which was in favour of considering the advisability of "obtaining powers to own a coal-pit, or being able to buy or sell coal, either as a separate Corporation or in conjunction with other public bodies, so as to break down the coalowners' monopoly, and institute a sale of coal supplies that shall be at a fair price as between buyer and seller, so that poor folks shall not be fleeced and starved by the action of the colliery proprietors increasing the price of coal, as at present, 4s. per ton, and laying the blame on the miners, who have only secured about 2d. per ton advance in their low-enough wages." Alderman Turner argued that if it were impossible to buy a colliery, the Corporation ought to amalgamate with Leeds, Bradford, Dewsbury, and other places to make large contracts for coal, and supply it to householders at (say) from 10s. to 13s. a ton, in place of the 16s. or 17s. which had now to be paid to the colliery owners.

Fires and Electric Lighting.

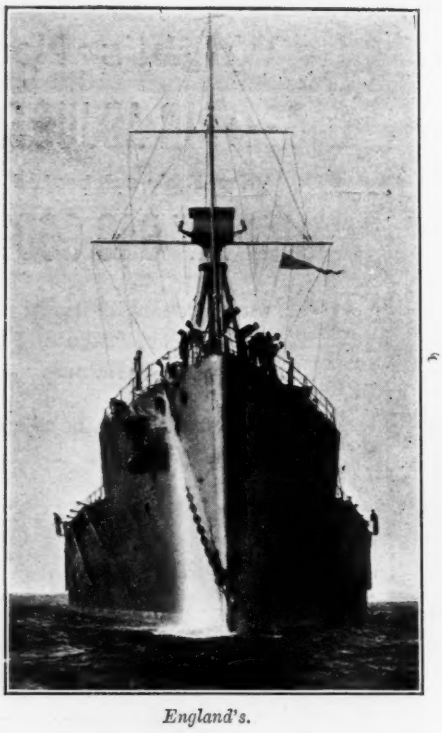
Camden Church, Camberwell, suffered considerable damage from fire on Saturday night. Report says that the cause of the outbreak is at present a matter of conjecture; but the general opinion is that it was due to a wire fusing in the vicinity of the choir organ, where the greatest havoc was wrought. The entire chancel suffered extensively; and the new organ, recently erected at a cost of about £1500, has been almost completely destroyed. It is estimated that some thousands of pounds of injury has been occasioned. A fire broke out on Saturday afternoon in St. Paul's Churchyard, at a jeweller's situate immediately opposite the north entrance to the Cathedral. It was caused, so far as can be ascertained, by the fusing of the electric light wires.

Sales of Stocks and Shares.

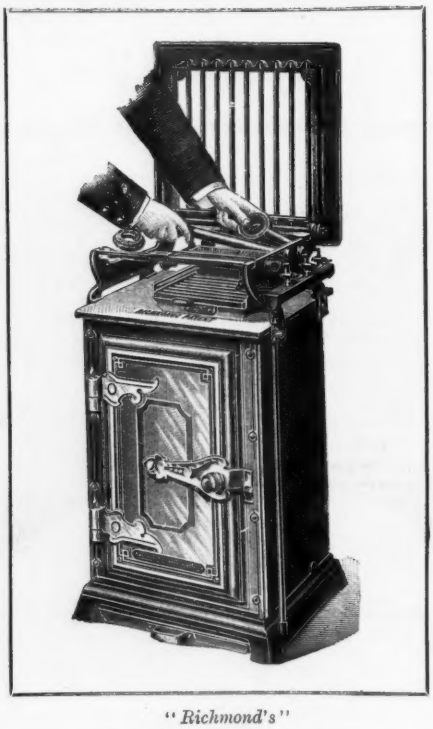
At the Mart, Tokenhouse Yard, E.C., last Tuesday, Mr. Alfred Richards offered for sale, by order of the Directors, new issues of £5000 of 5 per cent. ordinary stock and £4350 of 4 per cent. perpetual debenture stock of the South Essex Water-Works Company. The ordinary stock ranked for a maximum dividend of 5 per cent., equally with the Company's existing similar capital, the last dividend on which was at the rate of 4¼ per cent. per annum, free of income-tax; and it was all sold at from £106 10s. to £108 15s. per £100 of stock, *cum div.* as from the 1st prox. The debenture stock fetched £109 per £100. On the same occasion, Mr. Richards sold for private owners a few fully-paid £5 shares in the Redhill Gas Company, carrying 10 per cent. dividend, at from £10 5s. to £10 10s. each; some 5 per cent. "B" stock of the Company, at from £100 to £100 5s. per £100; a small parcel of 5 per cent. preference stock of the Hornsey Gas Company, at £112 10s. per £100; some consolidated ordinary 5 per cent. stock of the West Ham Gas Company, carrying a dividend at the rate of £5 2s. 6d. per cent. per annum, at from £104 to £104 10s.; some 4 per cent. perpetual debenture stock of the same Company at £103; and some consolidated "B" stock (7 per cent.) of the Croydon Gas Company, carrying 11½ per cent. dividend, at £230. The last items on the particulars of sale were three parcels of stock of the Barnet District Gas and Water Company. Some "A" and "C" stock, carrying 7½ per cent. dividend, was sold at the rate of £160 per £100; some "B" stock, carrying 6½ per cent., fetching £136, and some "D" capital water stock, carrying 5¼ per cent., £111 per £100.

The Cowdenbeath Gas Company, Limited, have placed an order with Messrs. Robert Dempster and Sons, Limited, of Elland, for a steel tank and spiral-guided gasholder of 100,000 cubic feet capacity. The work has to be carried out under the supervision of Mr. J. B. Scott, the Company's Engineer.

TWO "DREAD-NOUGHTS."



England's.



"Richmond's"

with **GAS-AIR** *Adjuster.*

Advertisement of the RICHMOND GAS STOVE AND METER COMPANY, LTD.

Failure of the Electric Light at Barnes.—The municipal electric light supply at Barnes failed about half-past seven o'clock last Tuesday night, and left the town in darkness where gas was not available. Many tradesmen utilized candles in their shops, while others quickly closed their establishments.

Guildford Arbitration Award.—The award of the Arbitrator (Sir John Wolfe-Barry, K.C.B.) in the proceedings to ascertain the price to be paid by the Guildford Corporation for such portions of the undertaking of the Woking Water and Gas Company as are included within an extension of the borough, was issued last Tuesday. The Company claimed £73,626; the Corporation's valuation was £23,998; and the Arbitrator has awarded £46,900. The proceedings were reported in the last volume of the "JOURNAL," pp. 485, 635, and 762.

Gas Lighting for Villages Outside Exeter.—The Exeter Gas Company intend to lay mains to Alphington and Ide, villages within two miles of the city. This extension is regarded as showing enterprise on the part of the Company, because, in addition to serving the inhabitants of the villages, there is the prospect of custom from the occupants of large country houses in the vicinity. Before the Company can proceed with the work, the sanction of the Local Authorities concerned has to be obtained; and these formalities are now proceeding. It is stated that the introduction of gas will be gladly welcomed by the public men in the two villages.

Reduction in the Price of Gas at Middlesbrough.—At the meeting of the Middlesbrough Town Council last Tuesday, the Mayor (Mr. W. G. Roberts), in moving the adoption of the Gas Committee's minutes, pointed out that there was a recommendation of a reduction of 1d. per 1000 cubic feet in the price of gas. Mr. Calvert having seconded the motion, Alderman Archbold observed that they were reducing the price of gas when coal was rising. It had increased very considerably, and he believed it would go up another 3s. He moved that the clause in the minutes as to the reduction in price should not be confirmed. The amendment was, however, lost, and the minutes were confirmed. The reduction takes effect as from the 1st inst.

Waste of Water Checked at Ilkley.—A year or two ago, the Ilkley District Council were deploring an inadequate supply of water, notwithstanding that a large storage reservoir had just been completed, and considerable expenditure incurred in acquiring springs and utilizing gathering-grounds in the district. Before any expensive scheme was taken in hand to augment the supply, it was decided to fix a waste-detecting meter below the principal reservoir; and the result has been that serious leakages have been detected and remedied, effecting a saving of close upon 100,000 gallons per day. This will render any increased supply unnecessary for a long time to come, as the quantity of water saved is nearly equal to supplying twice the present number of residents at Ilkley.

Birmingham Corporation and Gas-Fitters.—A deputation representing the Birmingham Master Gas-Fitters' Association has had a further interview with the Gas Committee of the Corporation relative to the hire and fixing of gas-stoves; and, according to the "Ironmonger," the Association hope shortly to secure one or two concessions from the Committee. Attention was directed first of all to the hire of gas-cookers; and it is understood that the Committee are quite willing to allow the local gas-fitters to act as their agents in this department, subject to the approval of the Finance Sub-Committee. If this proposition is agreed to, the Committee will furnish the gas-fitters with sample stoves for exhibition purposes—supplying stoves to consumers on the same terms as at present. The gas-fitters are to fix the stoves at prices similar to those now charged by the Gas Department, a schedule of which will be supplied to them.

Opposition to the Tynemouth Water Bill.—The Bill promoted by the Tynemouth Corporation for the extension of their limits of water supply, which is to come before a Committee of the House of Lords whose sittings commence next Tuesday, is being opposed by practically the whole of the Local Authorities whose areas are affected. The extended limits sought by Tynemouth include one borough (Morpeth), four urban districts (Ashington, Bedlington, Cramlington, and Newbiggin-by-the-Sea), and numerous areas in two rural districts (Tynemouth and Morpeth). The grounds of this general objection to the Bill vary in accordance with the local circumstances of the districts. In the case of Morpeth borough, it was not until last week that the Town Council decided definitely that Tynemouth's conditions were unacceptable; and the Morpeth Municipality are now taking the necessary steps to be represented before the Committee. It is understood that the Local Government Board have drawn up, for presentation to the Committee, a report in which some of the clauses of the Bill are adversely criticized; the Board being unfavourable to the inclusion of certain areas within the limits of the promoters.

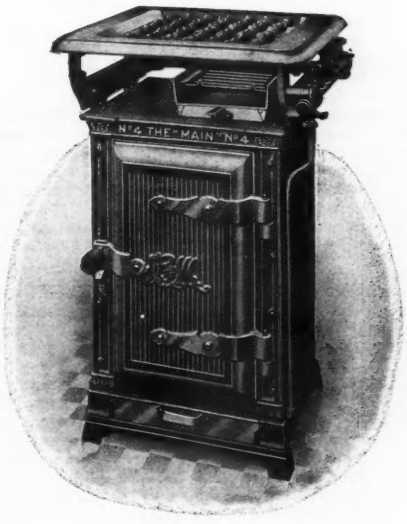
Developments in Coke Manufacture in the North.—In the Engineering Supplement to "The Times" last Wednesday, some particulars were given in regard to the development of coke manufacture in the North of England. It was stated that the results of the installation of bye-products coking plant at Blaydon have induced the County of Durham Electrical Power Distribution Company, Limited, to form a subsidiary concern—"The Waste Heat Company"—to erect other sub-stations. The Power Company will take the entire waste heat from the colliery coking plant, and supply the proprietor, at a fixed charge per unit, with all the power required for working his machinery above and under ground. Messrs. Bolckow, Vaughan, and Co. at some of their recently-opened collieries in South Durham have adopted the bye-products ovens, and are now laying the foundations for a battery of 100 at their Auckland Park and Black Boy Colliery, Shildon, near Darlington. Messrs. Pease and Partners, Limited, have for some time past had installations of 50 and 35 of the Otto-Hilgenstock ovens in regular operation at their Eldon and St. Helen's collieries respectively; and they have recently arranged for the installation of 120 ovens of similar design at Bank Foot, Crook. At their Fence Houses Collieries, situated between Durham and Sunderland, the Lambton Collieries, Limited, are introducing a battery of 30 of the Semet-Solvay ovens, in order to utilize their duff coal economically.

SEASON 1907.

The "MAIN"

Gas

Cookers



High Grade Cookers.

Beautifully Enamelled.

R. & A. MAIN, LIMITED,

LONDON, GLASGOW, AND FALKIRK.

ALSO AT

BIRMINGHAM, BRISTOL, MANCHESTER, MELBOURNE, AND SYDNEY.

Another Artesian Boring in the City.—One of the latest buildings in London to be provided with an artesian well, so as to have an independent water supply, is Mansion House Chambers, Queen Victoria Street, where the whole of the water is obtained from a boring, which has been carried down through the Woolwich and Reading beds into the chalk formation. The water obtained has proved on analysis to be of excellent quality. A specially-designed electrically-driven artesian well pump has been lowered into the borehole to a depth of 230 feet, and it delivers 1000 gallons per hour into a large masonry reservoir situated in the basement. The water is then forced up by a second set of pumps into the tanks on the roof of the building, whence it gravitates to the different floors. The installation has been carried out by Messrs. Alfred Williams and Co., of Bow.

Primitiva Gas and Electric Lighting Company of Buenos Aires, Limited.—At the forthcoming annual general meeting of this Company, the Directors will report that the total at the credit of the profit and loss account for the year ending the 31st of December last is £113,488. Adding the balance brought forward (£16,986), a total of £130,474 is produced. Deducting interest, &c., two dividends on the preference shares, an interim dividend of 2s. 6d. on the ordinary shares, and £14,736 placed to the reserve, there is a balance of £34,612, out of which the Directors recommend that a final dividend of 4s. 6d. per share, free of income-tax, making a total of 7 per cent. for the year, should be declared on the ordinary shares. This will absorb £18,000, and leave £16,612 to be carried forward to the next accounts. There was a steady increase in the demand for cooking and heating stoves during the past year.

Water-Works for a Welsh Town.—The town of Ystradgynlais, in Breconshire, has lately been provided with a good water supply; the works, commenced last September, having been formally opened last Thursday week by Mrs. Cecil Gilbertson. The water is obtained from springs; and the population to be served is about 5500, for the inhabitants of Lower Ystradgynlais. It is estimated, however, that the dry-weather flow is sufficient to supply a population ten times the present number. The water at the springs is collected into a tank, from which a 4-inch main is laid to supply the high-level districts; a separate pipe carrying the overflow to a service reservoir with a capacity of 90,000 gallons, from which the greater part of the parish will be supplied. The quantity available is estimated at 15 gallons per head per day. The works have been carried out at a cost, including land, of £6500; and in undertaking them the District Council had the cordial support and assistance of Mr. Moore-Gwyn, a local resident who has done much for the district.

Staveley Water Supply.—Last Wednesday week, Mr. M. K. North, M.Inst.C.E., held an inquiry, on behalf of the Local Government Board, into an application by the Chesterfield Rural District Council to borrow £5500 for the purposes of defraying the cost of providing the parish of Staveley with water from the Barbrook reservoir. The Council had apportioned the above-named sum between certain parishes, one of which is Unston; and the Overseers of the parish appealed to the Board against the apportionment. It was urged on their behalf that the district rate had already been increased by 9d. in the pound for water purposes, and that therefore the Overseers were justified in asking that the parish might be relieved entirely from further contribution. It was submitted, for the Council, that the share of Unston was extremely small, and that the annual repayment of loan and interest would represent less than a rate of 1d. in the pound; and the hope was expressed that there would be no alteration in the system of apportionment, which had been in operation ever since the year 1889.

Labour Trouble at the Devonport Gas-Works.—At a meeting of the Devonport Town Council last Thursday, attention was called by Mr. Monk, one of the Labour members, to the case of some stokers at the gas-works, who, he alleged, had been victimized for refusing to proceed with their work. Alderman Hornbrook said no men had been victimized, but two men of each of three shifts who were not required had been employed on other work at the ordinary pay of that class of work. Mr. Monk asserted that the Gas Committee had been a little too hasty. The men did not refuse to work; but the foreman would not allow them to do so. Alderman Hornbrook said the case had been dealt with by the Engineer (Mr. J. W. Buckley) in the usual way. The men were advised by the foreman to resume work, and they refused—an illegal act for which they might have been sent to prison. The men did not wish to come before the Committee. If they had done so, they would have been listened to with patience and with a leaning towards them. No one knew this better than the Labour representative on the Committee. Mr. Stroud, the representative referred to, acknowledged that this was quite true. The incident then closed.

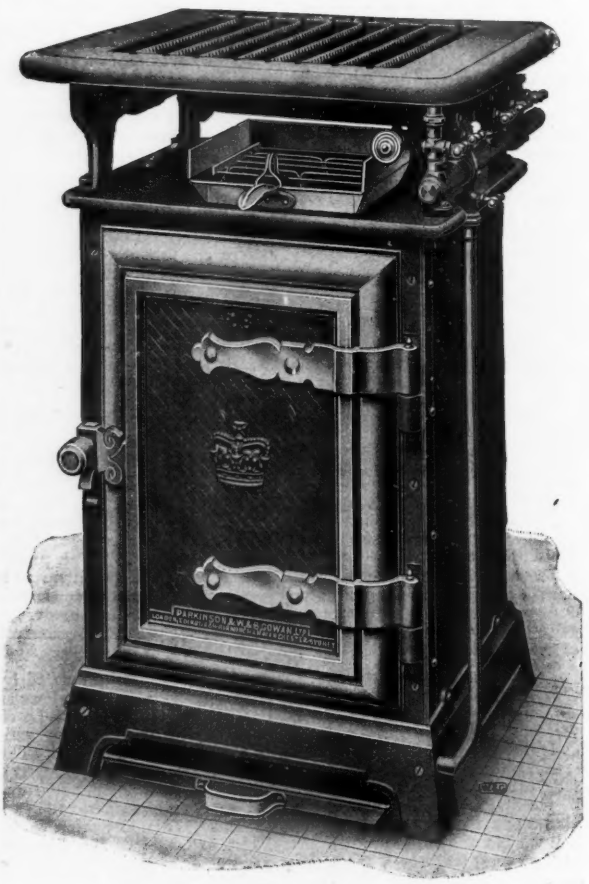
The Public Lighting of Newquay.—It has been decided by the Newquay Urban District Council to have the streets of the village lighted by electricity, and an intimation was given to the Gas Company that their burners would have to be removed from the lamps and the gas disconnected. At a meeting of the Council last week, it was stated that the Gas Company had not complied with the instruction, and suggested that the Council should continue to use gas until the 1st of June, so as to give a reasonable time for the disconnection of the lamps. The Surveyor said the Electric Lighting Company wished to begin the installation of their light at once, and have it completed by the date named. He had seen representatives of the two Companies, and was afraid there was no likelihood of an agreement between them. Mr. Rickeard considered the Council responsible for the difficulty, as they had not given any notice to the Gas Company. The Chairman (Mr. J. Vivian) thought it only fair that the Company should have a reasonable time for the work. The Clerk remarked that the Company had been lighting the town for a number of years, and were, in his opinion, entitled to a quarter's notice. The Surveyor remarked that the Gas Company were contemplating the laying of new mains, and suggested that the disconnection of the lamps should take place at the same time. It was finally decided that the Company should have notice to disconnect the lamps at present fixed throughout the district by May 31.

THE

"PARKINSON"

COOKER

"CROWN" PATTERN.



Supplied, if required, with

GAS AND AIR REGULATOR

Easy to manipulate and ensuring perfect combustion with all qualities of gas and at all pressures.

PARKINSON AND W. & B. COWAN, LTD.
(PARKINSON BRANCH),
COTTAGE LANE, CITY ROAD, LONDON. | BELL BARN ROAD, BIRMINGHAM.

At Coggeshall, Essex, water was sold last year at ½d. a bucketful; and at a recent meeting of the Braintree District Council, it was reported that during the hot summer months 18,720 bucketfuls were so sold, showing a return of £39. In view of the great hardship which last summer's water famine brought upon the poorer inhabitants of the town, the Council have decided to adopt a water-works scheme at a cost of £4000.

We learn from a local paper that the shareholders of the Kirkby Moorside Gas and Water Company have agreed to voluntarily wind-up the concern. A new Company, named the Kirby Moorside Lighting Company, is to be formed, with a capital of £3000 in £1 shares, with power to issue further capital as required. Shareholders of the old Company will receive shares credited as being paid up to the extent of 10s., and with a liability of 10s., of which 5s. per share is to be forthwith called up.

The Directors of the Buenos Ayres (New) Gas Company, Limited, recommend a dividend of 4 per cent., or 8s. per share, tax free, for the six months ended Dec. 31 last (making 7 per cent. for the year 1906), placing £5000 to the plant renewal fund, and carrying forward to the next account £25,043.

Mr. W. Watson, the Churchwarden of the Parish Church, Ross, in which, it may be remembered, the Bland incandescent gas system was installed last September, has lately written to Messrs. Bland to testify to its continued success, and to the considerable saving of gas effected by it. He says: "The Gas Company's bill is about half what it was with the old naked burners. The quarter ending March 31 last shows a reduction on March 31, 1906, of 30,700 cubic feet, and a saving of £6 2s. 9d. In six months' daily use, I have had to replace only three mantles and one globe out of 55 lights."

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

ASSISTANT ENGINEER AND GENERAL MANAGER. No 4759.
LABORATORY ASSISTANT. Alexander Wright and Co., Westminster.
CHARGE OF SLOT COOKER AND LIGHTING WORK. No. 4756.
SULPHATE OF AMMONIA MAKER. No. 4758.

CORRESPONDENCE AS TO ORGANIZATION AND MANAGEMENT. No. 4757.

Situation Wanted.

CLERK AND SALESMAN. No. 4757.

Plant (Second-Hand), &c., for Sale.

PURIFIERS, &c. Stratford-on-Avon Gas Department.
PURIFIERS, &c. Perth Gas Department.
STATION METER AND WASHER-SCRUBBER. Chester Gas-Works.

Plant (Second-Hand) Wanted.

HYDRAULIC MAINS, ASCENSION PIPES, MOUTHPIECES, &c. No. 4760.

Company Meeting.

IMPERIAL CONTINENTAL GAS ASSOCIATION. Cannon Street Hotel. May 7. 2.30 o'clock.

Stocks and Shares.

BARKING GAS COMPANY. May 7.
BRENTFORD GAS COMPANY. April 23.
CHIGWELL, LOUGHTON, AND WOODFORD GAS COMPANY. April 23.
EAST GRINSTEAD GAS AND WATER COMPANY. May 7.
ILFORD GAS COMPANY. April 23.
IMPERIAL CONTINENTAL GAS ASSOCIATION. April 23.

Stocks and Shares—*continued*.

LEATHERHEAD GAS AND LIGHTING COMPANY. April 24.
NEWCASTLE AND GATESHEAD WATER COMPANY. April 22.
SOUTH SUBURBAN GAS COMPANY. April 23.
SOUTHEND WATER COMPANY. April 23.
TENDRING HUNDRED WATER COMPANY. May 7.
UXBRIDGE GAS COMPANY. May 7.

TENDERS FOR

Benzol, Light Oil, and Naphtha.

BRIDGEWATER COLLIERIES. Tenders by April 22.

Carburetted Water-Gas Plant.

ASHFORD GAS DEPARTMENT. Tenders by April 23.

Carburettor.

BUXTON GAS DEPARTMENT.

Coal and Cannel.

BODMIN GAS CONSUMERS' COMPANY. Tenders by April 23.
BRECHIN GAS COMPANY. Tenders by April 29.
DENTON GAS DEPARTMENT. Tenders by April 27.
LEIGH-ON-SEA GAS DEPARTMENT. Tenders by April 24.
MONTROSE GASLIGHT COMPANY. Tenders by April 29.

Fire-Clay Goods.

AUDLEY GAS DEPARTMENT. Tenders by April 23.
MIDDLETON GAS DEPARTMENT. Tenders by April 22.
NEW MILLS GAS DEPARTMENT. Tenders by April 23.

Gasholder and Tank.

BARNOLDSWICK GAS DEPARTMENT. Tenders by April 24.

Gasholder (Addition to).

PADIHAM GAS DEPARTMENT. Tenders by April 30.

General Stores, Oils, Lime, &c.

MALVERN GAS DEPARTMENT. Tenders by April 29.

Governor and Tar-Column.

MIDDLETON GAS DEPARTMENT. Tenders by April 22.

Ironwork and Bar and Sheet Iron, &c.

COVENTRY GAS DEPARTMENT. Tenders by April 22.
MALVERN GAS DEPARTMENT. Tenders by April 29.

Mantles.

MALVERN GAS DEPARTMENT. Tenders by April 29.

Pipes, &c.

GLOUCESTER GASLIGHT COMPANY. Tenders by May 3.
GOOLE GAS AND WATER DEPARTMENT.
LEEDS GAS DEPARTMENT. Tenders by April 22.
MALVERN GAS DEPARTMENT. Tenders by April 29.
MIDDLETON GAS DEPARTMENT. Tenders by April 22.

Retort Fittings, &c.

LEEDS GAS DEPARTMENT. Tenders by April 22.

Retort Installations (Inclined and Horizontal).

AUDLEY GAS DEPARTMENT. Tenders by April 23.
MIDDLETON GAS DEPARTMENT. Tenders by April 22.
NEW MILLS GAS DEPARTMENT. Tenders by April 23.

Sulphuric Acid.

MALVERN GAS DEPARTMENT. Tenders by April 29.

Tar and Liquor.

DENTON GAS DEPARTMENT. Tenders by April 27.
MALVERN GAS DEPARTMENT. Tenders by April 29.

Washer.

MIDDLETON GAS DEPARTMENT. Tenders by April 22.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 146.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
500,000	10	Apl. 11	10½	Alliance & Dublin 10 p.c.	20⅞–21⅞*	..	4 17 8
268,324	10	,,	7⅞	Do. 7 p.c.	14–15*	..	5 0 0
200,000	5	Nov. 14	7	Bombay, Ltd.	6¾–7¼	..	4 16 7
40,000	5	,,	7	Do. New, £4 paid	5–5⅝	..	5 1 10
50,000	10	Feb. 28	14	Bourne-mouth Gas and Water } 10 p.c. & B 7 p.c. Pref. 6 p.c.	27⅝–28½	..	4 18 3
51,810	10	,,	7		16¾–17	..	4 2 4
53,200	10	,,	6		14⅜–15⅜	..	3 17 5
380,000	Stk.	,,	12½	Brentford Consolidated	250–255	..	4 18 1
300,000	,,	,,	9⅜	Do. New	190–195	..	4 17 5
50,000	,,	,,	5	Do. 5 p.c. Pref.	117–122	..	4 2 0
206,250	,,	Dec. 13	4	Do. 4 p.c. Deb.	101–104	..	3 16 11
220,000	Stk.	Mch. 14	11¼	Brighton & Hove Orig.	220–225	..	5 0 0
246,320	,,	,,	8¼	Do. A. Ord. Stk.	160–165	..	5 0 0
460,000	20	Apl. 11	10	British	42–43*	..	4 13 0
104,000	Stk.	Feb. 28	6	Bromley, Ord. 5 p.c.	119–122	..	4 18 4
165,700	,,	,,	4⅜	Do. do. 3½ p.c.	90–93	..	4 16 9
500,000	10	Oct. 12	7	Buenos Ayres (New) Ltd.	11⅛–12	..	5 16 8
250,000	Stk.	Dec. 13	4	Do. 4 p.c. Deb.	93–95	..	4 4 3
150,000	20	Mch. 14	8½	Cagliari, Ltd.	23–25	..	6 12 0
100,000	10	Sept. 27	10	Cape Town & Dis., Ltd.	14–15	..	6 13 4
100,000	10	Oct. 26	4½	Do. 4½ p.c Pref.	8⅛–9⅛	..	4 14 9
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	51–53	..	5 13 2
50,000	Stk.	Dec. 28	4½	Do. 4½ p.c. Deb. Stk.	16–98	..	4 11 10
157,150	Stk.	Feb. 28	5	Chester 5 p.c. Ord.	109–111	..	4 10 1
1,443,280	Stk.	,,	5⅝	Commercial 4 p.c Stk.	107–110	..	4 14 6
560,000	,,	,,	5	Do. 3½ p.c. do.	105–108	..	4 12 7
475,000	,,	Dec. 13	3	Do. 3 p.c. Deb. Stk.	83–85	..	3 10 7
800,000	Stk.	,,	6¼	Continental Union, Ltd.	120–123	..	5 5 8
200,000	,,	,,	7	Do. 7 p.c. Pref.	138–143	..	4 17 11
463,170	Stk.	Aug.	5½	Derby Con. Stk.	122–124	..	4 8 9
55,000	,,	Jan.	4	Do. Deb. Stk.	103–105	..	3 16 2
486,090	10	Jan. 31	11	European, Ltd.	24–25	..	4 8 0
354,060	10	,,	11	Do. £7 10s. paid	18–19	..	4 6 10
15,203,110	Stk.	Feb. 14	4⅛	Gas-light and Coke } 4 p.c. Ord.	95–97	..	4 10 10
2,600,000	,,	,,	3⅜	3½ p.c. max.	87–89	..	3 18 8
3,799,735	,,	,,	4	4 p.c. Con. Pref.	105–107	..	3 14 9
4,193,975	,,	Dec. 13	3	3 p.c. Con. Deb.	83–85	..	3 10 7
258,740	Stk.	Mch. 14	5	Hastings & St. L. 3½ p.c.	95–100	..	5 0 0
82,500	,,	,,	6⅛	Do. do. 5 p.c.	116–119	..	5 9 3
70,000	10	Oct. 12	11	Hongkong & China, Ltd.	19½–20⅛	..	5 7 4
4,940,000	Stk.	Nov. 14	8	Imperial Continental	178–181	+1	4 8 5
473,600	Stk.	Feb. 14	3½	Do. 3½ p.c. Deb. Red.	93–95	..	3 13 8
181,601	Stk.	Mch. 14	6	Lea Bridge Ord. 5 p.c.	117–122	..	4 18 4
306,083	,,	Dec. 28	4	L'rpool Unit'd Deb. Stk.	110–112	..	3 11 5
561,000	Stk.	Feb. 28	10	Liverpool United A	223–225	..	4 8 11
718,100	,,	,,	7	Do. B	164–165	..	4 4 10
144,140	Stk.	Feb. 14	7⅜	Maidstone 5 p.c.	142–147	..	5 3 8
75,000	5	Nov. 29	5	Malta & Medn., Ltd.	4¼–4⅜	..	5 5 3
560,000	100	Apl. 2	5	Met. of } 5 p.c. Deb.	100–102	..	4 18 0
250,000	100	,,	4½	Melbourne } 4½ p.c. Deb.	100–102	..	4 8 3
541,920	20	Nov. 14	3¼	Monte Video, Ltd.	11⅜–12⅜	..	5 12 0
1,775,892	Stk.	Feb. 28	4⅜	Newc'tle & G'tesh'd Con.	104–106	..	4 7 3
406,025	Stk.	Dec. 28	3½	Do. 3½ p.c. Deb.	96–97	..	3 12 2
15,000	10	Feb. 28	10	North Middlesex 10 p.c.	19½–20½	..	4 17 7
55,940	10	,,	7	Do. 7 p.c.	13–14	..	5 0 0
300,000	Stk.	Nov. 29	8	Oriental, Ltd.	150–155	..	5 3 3
60,000	5	Mch. 27	7	Ottoman, Ltd.	6–6½	..	5 7 8
398,490	5	Oct. 26	7	Primitiva Ord.	7⅞–8⅛	+⅛	4 4 10
796,980	5	Jan. 31	5	Do. 5 p.c. Pref.	5–5⅛	..	4 15 3
488,900	100	Dec. 1	4	Do. 4 p.c. Deb.	95–97	..	4 2 6
1,000,000	10	Oct. 12	8†	River Plate Ord.	13–13⅜	+⅛	5 18 6
312,650	Stk.	Dec. 28	4	Do. 4 p.c. Deb.	95–97	..	4 2 6
250,000	10	Mch. 27	8	San Paulo, Ltd.	12½–13	..	6 3 1
125,000	50	Jan. 2	5	Do. 5 p.c. Deb.	48–50	..	5 0 0
135,000	Stk.	Mch. 14	10	Sheffield A	244–246	..	4 1 4
209,984	,,	,,	10	Do. B	244–246	..	4 1 4
523,500	,,	,,	10	Do. C	244–246	..	4 1 4
70,000	10	Oct. 26	10	South African	15⅝–16⅜	..	6 1 3
6,350,000	Stk.	Feb. 14	5⅜	South Met., 4 p.c. Ord.	121–123	+½	4 9 5
1,895,445	,,	Jan. 16	3	Do. 3 p.c. Deb.	84–86	..	3 9 9
201,720	Stk	Mch. 14	8	South Shields Con. Stk.	157–159	+3	5 0 8
605,000	Stk.	Feb. 28	5½	S'th Suburb'n Ord. 5 p.c.	120–123	..	4 9 5
60,000	,,	,,	5	Do. 5 p.c. Pref.	120–123	..	4 1 4
117,058	,,	Jan. 16	5	Do. 5 p.c. Deb. Stk.	125–130	..	3 16 11
502,310	Stk.	Nov. 14	5	Southampton Ord.	107–112	..	4 9 3
120,000	Stk.	Feb. 28	6½	Tottenham and Edmonton } A 5 p.c. & B 3½ p.c. & 4 p.c. Deb.	123–126	..	5 3 2
398,940	,,	,,	5		101–103	..	4 17 1
137,500	,,	Dec. 28	4		101–103	..	3 17 8
182,380	10	,,	8	Tuscan, Ltd.	10½–11	..	7 5 6
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	102–104	..	4 16 2
193,742	Stk.	Feb. 28	5	Tynemouth 5 p.c. max.	105–107	+1	4 13 6
30,000	Stk.	Feb. 14	8	Wands-worth and Putney } A 5 p.c. & B 3½ p.c. & C 3½ p.c. & 3 p.c. Deb. Stk.	—	..	—
255,636	,,	,,	6½		135–140	..	4 12 10
75,000	,,	,,	5⅝		111–113	..	4 19 1
79,416	,,	Dec. 28	3		79–82	..	3 13 2
845,872	,,	Feb. 28	5⅛	West Ham 5 p.c. Ord.	101–104	..	4 18 6
185,000	,,	,,	5	Do. 5 p.c. Pref.	120–123	..	4 1 4
228,300	,,	Dec. 28	4	Do. 4 p.c. Deb. Stk.	102–105	..	3 16 2

Prices marked * are "Ex div." † Next dividend will be at this rate.

The Northampton Town Council have decided to spend £6216 on machinery and £2000 on new buildings in connection with their water-works at Ravensthorpe.

The Directors of the Imperial Continental Gas Association recommend a dividend of 4 per cent., free of tax, for the six months ending the 31st of December last.

Mr. John Walsh, the Vice-Chairman of Messrs. Henry Pooley and Son, Limited, of Birmingham, has been appointed a Director of the New Conveyor Company, Limited.

The Directors of the Oriental Gas Company, Limited, have resolved to pay an interim dividend at the rate of 3½ per cent., free of income tax, on account of the year ending the 30th of June next. The dividend is at the same rate as last year.

At the Tottenham Police Court last Thursday, John Hearn was sentenced to a month's imprisonment, with hard labour, for stealing, by means of the usual india-rubber tube, a quantity of gas, valued at £5, the property of the Enfield Gas Company.

A sentence of twelve months' imprisonment with hard labour was a few days ago passed by the Recorder at Portsmouth upon Richard Brobson, a labourer, for breaking open one of the prepayment gas-meters of the Portsea Island Gas Company, and stealing 5s. 2d.

An appeal by the Cardiff Corporation against the assessment of their water-works located in the Brecon Union will come on at the next Breconshire Quarter Sessions. The Assessment Committee have been authorized by the Board of Guardians to take all necessary steps to oppose the appeal.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

United Kingdom: One Year, 21s.; Half Year, 10s. 6d.; Quarter, 6s. 6d.

Payable in advance. If credit is taken, the charge is 25s. a year.

Abroad (in the Postal Union): £1 7s. 6d., payable in advance.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

OXIDE OF IRON.

O'NEILL'S OXIDE
For GAS PURIFICATION.
LARGEST SALE OF ANY OXIDE,

SPENT OXIDE PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO., LD.,
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C.

WINKELMANN'S
"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

BROTHERTON & CO., LIMITED.
Offices: Commercial Buildings, LEEDS.
Correspondence invited.

PATENTS AND TRADE MARKS
PUBLICATIONS, "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; "SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

THE TAR (PATENTS) SOLIDIFYING
AND DISTILLING CO., LTD., of 15, MANSION HOUSE CHAMBERS, LONDON, E.C., GRANT LICENCES to Gas-Works, Collieries, and others to use their process. Particulars of the SECRETARY.

AMMONIACAL Liquor wanted.
BROTHERTON AND CO., LTD., Ammonia Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, WAKEFIELD, AND SUNDERLAND.

INCREASE YOUR MAKE.
SEND for Particulars of the "RAPID"
Carburettor. Why be short of Gas when you can stretch the make from 1000 to 2000 cubic feet per ton, without any difficulty?
BIGGS, WALL, & Co., 13, Cross Street, Finsbury Pavement, LONDON.

GAZINE—A radical Solvent and Preventative of Naphthalene deposits, and the Automatic cleaning of Mains and Services.
It is also used for the Enrichment of Gas, and has an illuminating value double that of 90 per cent. Benzol.
Supplied by C. BOURNE, West Moor Chemical Works, KILLINGWORTH, or through his Agent, F. J. NICOL, Pilgrim Street Chambers, NEWCASTLE-ON-TYNE.
Telegrams: "DORIC," Newcastle-on-Tyne. National Telephone No. 2497.

SULPHATE OF AMMONIA
SATURATORS and all LEAD and TIMBER WORK in Connection with Sulphate Plants.
We guarantee promptness, with efficiency for Repairs.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.
Telegrams: SATURATORS, BOLTON. Telephone 0848.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 54 & 47, Westminster Bridge Road, LONDON, S.E.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS, AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 254 Oldham, and 2412 HOP, London.
Telegrams:—
"BRADDOCK, OLDHAM," and "METRIQUE, LONDON."

"NUGEPE" GAS PLANT CEMENT.
JOHN E. WILLIAMS AND CO.,
LOWER MOSS LANE,
MANCHESTER, S.W.
For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 50 Years. References given to Gas Companies.

GAS TAR wanted.
BROTHERTON AND CO., LTD., Tar Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, WAKEFIELD, AND SUNDERLAND.

GAS OILS.
MEADE-KING, ROBINSON, & CO.
Represent the Strongest Independent Refineries in America; also Petroleum Spirit for Gas Enrichment. 18, EXCHANGE STREET, MANCHESTER, and 11, OLD HALL STREET, LIVERPOOL.

BENZOL
AND
CARBURINE FOR GAS ENRICHING.
ALSO
THE MAXIM PATENT CARBURETTOR.

For Prices, &c., apply to
THE GAS LIGHTING IMPROVEMENT CO., LTD.,
7, BISHOPSGATE STREET WITHOUT,
LONDON, E.C.
Telegraphic Address: "Carburine, London."

BRISTOL RECORDING GAUGES AND THERMOMETERS.

J. W. & C. J. PHILLIPS, 23, COLLEGE HILL, LONDON, E.C., and 7, Park Square, LEEDS.

HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

OXIDE OF IRON.
(NATURAL.)
SPENT OXIDE PURCHASED.
BALE'S FIRE CEMENT.
PAINT FOR GAS-WORKS.

BALE & CHURCH,
5, CROOKED LANE, LONDON, E.C.

SULPHURIC ACID.

SPECIALLY prepared for the Manufacture of SULPHATE OF AMMONIA.
SPENCER, CHAPMAN, & MESSEL, LTD.
with which is amalgamated WM. PEARCE & SONS, LTD.
36, Mark Lane, LONDON, E.C. Works: SILVERTOWN.
Telegrams: "HYDROCHLORIC, LONDON."
Telephone: 341, AVENUE.

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia.
BROTHERTON AND CO., LTD., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, WAKEFIELD, and SUNDERLAND.

SITUATION wanted by a Show-Room CLERK and SALESMAN with Twenty Years experience. Well up in all the latest Appliances of Cooking and Heating Stoves, and Incandescents. Used to controlling Workmen. Splendid References. Age 34.
Address No. 4757, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

AN experienced Clerk in the Offices of a large Gas Company desires to correspond with a Gentleman in a similar position, with a view to the EXCHANGE OF INFORMATION on all subjects connected with the Office Organization and Management of a large Undertaking.
Address, in first instance, to No. 4755, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

LABORATORY Assistant (Junior) required for General Testing Work.
Apply, by letter only, stating explicitly Experience and Salary required, to ALEXANDER WRIGHT AND CO., LTD., 1, Westminster Palace Gardens, Artillery Row, VICTORIA STREET, S. W.

WANTED, immediately, in South Yorkshire, an Experienced SULPHATE of AMMONIA MAKER, preferably one used to Wilton's Discharger.
Apply, stating Age, Experience, Wages expected, &c, to No. 4758, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SLOT Cooker and Lighting Installation work. Experienced Practical Man wanted to Take Entire Charge. Good Post for suitable Man.
Apply, by letter, with full details, to No. 4756, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, an Assistant Engineer and General Manager who has had considerable experience in Gas-Works of over 100 Millions make per annum. Must be fully qualified and up-to-date in every respect, and have had a few years Experience previous in shops and offices at Gas-Works Plant Construction. None others need apply.
Age not under 30 or over 40. State same, and salary required for a few months as Assistant (pleasant, healthy part of England). If satisfactory, position would be Full Charge and very good salary within short time.
Two *copies* of Testimonials required, which will not be returned.
Address No. 4759, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.